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Notes and Comments

The Value of Research

IN common with other branches of Governmental activity, the axe has been applied to the Department of Scientific and Industrial Research, but we are pleased to learn from the annual report of the Department that the immediate usefulness of the work will not be seriously impaired. Scientific research has, in the past, made striking contributions to industrial progress, and we believe it will make even more contributions in the future. But the nation which will enjoy the benefits of science in the day-to-day progress of its industries is the nation which habitually applies scientific method and scientific knowledge, and it is that nation which will be able to seize the advantages of the more spectacular achievements of science in the industrial sphere. Scientific research cannot provide a ready-made solution of any of the present industrial difficulties, but it does point the road along which persevering effort may enable industry to find a way out of some of these difficulties.

A comprehensive review has been made by the Department during the past twelve months of the arrangements for promoting contact with industry, and it is satisfied that the steps already taken are in the right direction, and that the organisation which has been built up possesses the flexibility necessary to adapt itself to new needs as they may arise. Throughout their Report, of which we give extracts in other pages of this issue, the Department emphasises the need for scientific methods in industry. Research is to-day a necessity for the country whose industries are to survive the competition of energetic and scientifically informed rivals in the world market. The Advisory Council is well aware that it is emphasising a truth which is fully recognised in many cases. At the same time, there must be many who with the best will in the world to apply the results of scientific research are in some doubt of the means to be adopted in their particular case. To these, its advice is first to examine in detail, in the light of existing knowledge and with the help of the best scientific advice available, the whole of their manufacturing processes. Where this is not already periodically carried out, it is believed such an examination will reveal methods by which improvements, perhaps small in themselves, but amounting on the scale on which modern industry is conducted to hundreds of thousands of pounds, may be attained. Sometimes it is the raw materials that may be found susceptible of improvement, sometimes the plant—either by the modification of existing design or by the introduction of labour-saving devices; sometimes a use may be found for a waste product; sometimes a modification of the actual process employed will be found to be required. This examination joined with a knowledge of a distribution of costs of manufacture which the individual firm alone possesses, should indicate where future research can be most profitably employed.

The Department is ready to place at the disposal of *bona fide* inquirers all the scientific and technical information it holds available for assisting industry, and where necessary to carry out for individual firms at a suitable charge experimental investigations to solve technical problems of manufacture. So long as the Advisory Council is convinced, as it is to-day, that industry is showing itself increasingly ready to make effective use of science, so long will it be able to justify to the nation the policy of steady development, to meet new needs as they arise, which has guided the present members and their predecessors since the appointment of the first Advisory Council in 1915.

Contact with Industry

GRANTS have been made to research associations by by the Department from a sum of £1,000,000 voted by Parliament in 1917. The total sum so disbursed up to March 31 last was £868,000, against which industry had contributed about £1,250,000. It is the declared policy of the Department that each research association should ultimately become a self-supporting organisation maintained by the industry or industries benefited. The essential characteristic of these bodies is that they enjoy full responsibility for the discharge of their functions. They appoint their own staffs, make their own arrangements for carrying out research work, and draw up their own programmes. They also settle how the results of research are to be made available to members, though the Department retains a right of veto over the communication of results of research abroad. Of the various reasons which determined the choice of this form of research organisation for those industries to which it was suited, two—which are inter-related—were of special importance. By establishing an association for co-operative research, conducted by an industry itself, the characteristic qualities of industry in this country were given the fullest scope. The outstanding merit of British industry in the past had lain, as it does still, in the individual character of the effort, in its independence, enterprise and initiative. But the development of industry in other countries had already made it difficult for British manufacturers to meet the competition of foreign manufacture, often organised on a large scale with the full resources of available technical knowledge. The research association movement was designed to extend the manufacture, under peace conditions, the lesson then learnt, that by co-operation in technical knowledge much more was to be gained than lost.

This aim of the research association movement leads to the second great advantage these bodies possess. They lend themselves naturally to the promotion of contact between the scientific worker and the industrialist—a vital point. It is not an uncommon thing to find that a considerable part of the time of the staff of a research association is occupied in work for the firms which constitute it and in visits to works. In applying scientific ideas to technical problems, the staff, indeed, is intended to function as the "General Staff" of the industry. Some remarkable results, bringing substantial financial benefits to the industry concerned have already been achieved by research associations, and it is quite possible that the efforts of these bodies may at any time lead to the rapid development of a promising new industry or to the successful re-organisation of an existing industry through new or improved materials or processes of manufacture.

Income Tax and New Plant

MANUFACTURERS and traders have welcomed the explanations recently issued by the Board of Inland Revenue of the precise effect of Mr. Philip (now Lord) Snowden's announcement, when the September Budget was introduced, that a more liberal view was to be taken of what constitutes replacements for the purpose of income tax allowances under Schedule "D" for obsolescence of plant and machinery. According to the explanations, all kinds of plant and machinery are included, and the Board has relaxed the interpretation of the word "replacement" so that it is no longer limited to the substitution for existing plant and machinery of other plant or machinery performing "exactly the same functions."

One of a number of examples quoted by *The Times* last Tuesday was the case of a manufacturer of shaving sticks who, finding the demand falling off, decides to produce shaving cream in tubes. He scraps the plant that produced the sticks, and buys plant to turn out the cream in tubes, and would be entitled to obsolescent allowance in respect of the scrapped plant. Experience, especially in so rapidly changing an industry as chemistry, will show that the examples given by the Board of Inland Revenue may be reproduced in an infinite number of directions in actual business life. The concession is one that should go far towards assisting in the process of bringing equipment more into line with modern requirements, and should be reflected in new orders for British chemical plant manufacturers in common with the producers of other industrial machinery.

The Calendar

Jan. 18	Chemical Club: "Hormones." Professor E. C. Dodds.	2, Whitehall Ct., London.
19	Society of Chemical Industry (Birmingham and Midland Section): "Application of X-Rays to Chemical Problems." E. Gordon Cox. 7 p.m.	Chamber of Commerce, Birmingham
19	Mineralogical Society. 5.30 p.m.	Burlington House, London.
19 and 26	Royal Institution: "The Progress of Research Relating to Physical Metallurgy." Dr. C. A. Edwards. 5.15 p.m.	21, Albemarle Street, London.
20	Institution of Chemical Engineers: "High Pressure Electrolytic Cell." Dr. D. M. Newitt. 6 p.m.	Burlington House, London.
20	Society of Dyers and Colourists (Midlands Section): "Fastness of Colours to Sea Water and other Agencies." J. C. Grundy. 7.30 p.m.	University College, Nottingham.
20	Institute of Chemistry (Belfast Section): "Methods of Drug Analysis." Dr. W. Honneyman. 7.45 p.m.	Royal Belfast Academical Institution.
20	Royal Society of Arts: "Some Aspects of the Problem of Industrial and Communal Waste." J. L. Hodgson. 8 p.m.	John Street, Adelphi, London.
20	Society of Glass Technology: 2 p.m.	Manchester.
21	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, London.
21	Institute of Metals (Birmingham Section): "Electric Welding of Non-Ferrous Alloys." A. Burstall. 7 p.m.	Chamber of Commerce, Birmingham
22	Society of Chemical Industry (South Wales Section): "Accurate Volume and Weight Measurements." 7.30 p.m.	Technical College, Cardiff.
22	Oil and Colour Chemists' Association: "The After-Treatment of Painted Surfaces." Frank Fancutt. "Emulsions—The Practical Application of Colloidal Chemistry to Paints." A. Stewart.	College of Technology, Manchester.
22	Society of Chemical Industry (Liverpool and Manchester Sections): "Liquid Fuels, To-day and To-morrow." Dr. A. E. Dunstan. 6 p.m.	The University Liverpool.

The Industrial Application of Scientific Research

Work of the Department of Scientific and Industrial Research and the Research Associations

Industry in general is proving itself increasingly anxious to take advantage of applied science, and the assistance of the Department of Scientific and Industrial Research is becoming more and more in demand. In the Report for the year 1930-31 of the Department of Scientific and Industrial Research (H.M. Stationery Office, 3s. net), just issued, a full account is given of the work done and still in progress under the control of the Department, together with a review of the activities of the numerous research associations attached to various trades.

IN a foreword to this Report, Mr. Stanley Baldwin, Lord President of the Council, states that while it has been necessary in certain directions to curtail the expenditure of the Department, its immediate usefulness to industry will not be seriously impaired, for in deciding upon the economies the Council has had the closest regard to the important principles upon which the Department was established. It has been the endeavour of the Department to concentrate available funds on the work of the most immediate practical value to industry, leaving to happier times the expansion of work of which the results could only be available at some more distant date.

Referring to the work of the research associations, the Report states that a difficulty experienced by all the associations is that of bringing home to their members the practical significance of the scientific conclusions that have been reached. To overcome this difficulty, development departments have been established by some associations and scientific liaison officers appointed by others. They all endeavour to discharge the difficult task of explaining in simple language, phenomena which to the scientific mind can only be satisfactorily described in terms bearing a precise technical connotation. Some research associations have reached the conclusion that it is necessary to erect complete industrial plants embodying the results of their laboratory and small-scale researches before member-firms can evaluate the worth of these results or can appreciate the significance of their adoption in industrial practice. But research on the industrial scale is expensive and, indeed, beyond the present means of most research associations. Moreover, the operation of large-scale plant requires the services of trained men with industrial experience, such as are not always available on the staff of the associations. There is also the necessity to dispose of the products of the plant. These difficulties may in some measure be avoided if arrangements are made for the large-scale trial to be carried out in the works of a member-firm and this practice is, in fact, followed to a considerable extent. The Advisory Council regards the experience of research associations as reflecting accurately the problem of the application of scientific method and scientific knowledge in a considerable range of the industries of this country. For this reason, it has special significance in any attempt to assess the difficulties of promoting the application of science in industry and to determine the causes of those difficulties. The Council is satisfied with the successful achievement of the Research Associations as a whole, and is convinced that the expenditure incurred has been more than justified by the practical results already obtained and utilised.

Food Investigation

A contribution which, if confirmed, will be of great importance in plant physiology, has been made at the Low Temperature Research Station. It has been shown that acetaldehyde is a normal intermediate product in the breakdown and oxidation of sugar to its final products, carbon dioxide and water, in fruits and plant-tissues generally. In over-ripe fruits partial inactivation of the respiratory mechanism naturally occurs with an accompanying accumulation of acetaldehyde in the tissues. An interesting side-line in this work has been the discovery that, by artificially supplying the intermediate product, which can be done by keeping the fruit in an atmosphere containing a regulated amount of acetaldehyde vapour, the breakdown of sugar is thrown out of the usual course which, in the presence of oxygen, leads to carbon dioxide and water, and a considerable production of alcohol is set up in the living cells, i.e., the type of change which usually occurs only in the absence of oxygen.

Other investigations in progress or completed during the year are a physiological analysis of the effects of ethylene gas upon fruit and vegetables; a biochemical study of senescence in apples; an analysis of the internal factors which control the loss of water from living plant-tissues; a quantitative survey of the effects of traces of volatile substances in the atmosphere upon the growth of moulds and upon the ripening of fruits; an analysis of the respiratory system of the potato; a cytological investigation of the developmental stages in apples and pears and a biochemical investigation of post-mortem changes occurring in frozen fruits and vegetables.

Storage Life of Fruit

An investigation has been conducted for the Director of Food Investigation by the Imperial College of Science and Technology on the composition of apples grown on four different stocks on manured and unmanured plots at the Horticultural Research Station, East Malling. It has been found that a greater difference in composition results from difference in manuring than from a difference in stock. Continuation of the study of the effect of time of gathering on the storage-life of the apple has shown that fruit gathered very early (four weeks before the normal time) or rather late, loses solids more slowly during subsequent storage than that gathered at the normal time. It also suggests that if prematurely gathered fruit is placd in cold store, the starch present gives rise mainly to reducing sugars, with only a very little sucrose, and, further, that the concentration of sucrose at which inversion almost ceases during storage, is higher in late-gathered apples than in those gathered early. Quantitative determination of starch in the growing fruit has shown that a considerable amount of easily hydrolysable polysaccharide, other than starch and pectin, is formed during growth. A small amount of such a substance, which yields arabinose as one of its products of hydrolysis, has been isolated.

Chemical Research

A systematic examination of the anthracene fraction of low temperature tar has confirmed the presence in this material of anthracene and its homologues. In addition to the mono-, di- and tri- methyl derivatives of anthracene previously studied the new 2 : 3 : 6 : 7-tetramethylanthracene and the corresponding tetramethylanthraquinone have been synthesised and the former has been identified in low temperature tar. Among the higher phenols of low temperature tar identified by means of phenylcarbimide and *p*-xenylcarbimide are the following :—Homocatechol, *iso*-homocatechol, resorcinol and quinol. Two high vacuum distillation plants have been installed for use in the distillation of the least volatile neutral oils and phenols. At temperatures not exceeding 120° the greater part of the crystalloid portions of these fractions distils over, leaving behind the resinenes and resinols respectively. This procedure is a valuable addition to the methods now employed in separating tar constituents.

Experiments on base-exchange water softening made with solutions of magnesium sulphate in distilled water show that the amounts of magnesium removed by base-exchange materials are less as compared with calcium than those corresponding with equivalent proportions of the two metals. A study of the behaviour of base exchange materials towards dissolved salts of the heavy metals has indicated that copper, lead, tin and zinc can be removed from water by this process.

A detailed study of the preparation of α α′-dipyridyl by the dehydrogenation of pyridine with ferric chloride under pressure has led to the isolation of many by-products, including a new tripyridyl, which gives rise to exceptionally stable co-ordination compounds of iron and nickel. α α′—Dipyridyl itself has been utilised in the preparation of a series of stable complex salts containing bivalent silver. Starting from commercial diphenyl, a general method has been

worked out for the preparation of phenanthridine derivatives and homologues. Certain of the new products have chemical constitutions and physical properties which render them likely to be of therapeutic and pharmaceutical interest.

The Work of the Research Associations

Progress in investigations on blast-furnace linings and on refractories for gas retorts is reported by the British Refractories Research Association. In a number of industrial furnaces, particularly including the blast-furnace and the gas producer, carbon monoxide is capable of causing the disintegration of some of the fireclay materials used in the linings at temperatures in the neighbourhood of 500° C. This action follows the decomposition of the gas at certain ferruginous "spots" in the fireclay brick with the resultant deposition of carbon. A comprehensive survey of the factors influencing this type of deterioration has been initiated. The results so far obtained are sufficient to encourage the hope that the work will eventually lead to some explanation of the different susceptibilities of the various refractory materials to this disintegrating action, and to remedial treatment in the manufacture of the products. The Association has completed a considerable amount of work on the design, efficiency and operation of ceramic kilns. During the past year a study has been made of the proper dimensions of the flues and stacks of these kilns, a subject on which there is considerable uncertainty.

In a continuation of the study of the drying of clay ware, factors governing the cracking of these goods during drying have been considered, and from them a theory of drying mechanism developed. On this ground it is suggested that there is fundamentally a best drying temperature for any given clay at a definite water content. This leads to the tentative conclusion that there is a definite schedule for the quickest drying of any clay. Tunnel dryers have been classified and discussed according to their thermal efficiency, the method of application, and the nature of the heat supply. In the field of special refractory materials some experiments on chrome-silica bricks have been completed. It is shown that certain chrome silica bricks are mechanically stronger at high temperatures than the normal chrome brick. Also these products have a smaller reversible expansion than a silica brick, and the possibility of permanent expansion is reduced by the greater degree of conversion of the quartz, mainly to tridymite. Other properties of these bricks suggest definite fields of application in the steel industry.

Scientific Instruments

The British Scientific Instrument Research Association has devised a method by means of which it is possible to measure the thicknesses of iron plates, by observations made from one side of the plate only, with a degree of accuracy which would appear to be satisfactory for the testing of ships' plates, boiler plates, tank walls, etc. A provisional patent has been taken out covering the method employed, and the development of apparatus of a suitably robust and portable type is being studied. Two methods have been devised for maintaining an alternating current constant at some pre-determined value under conditions in which the voltage and frequency of the alternating-current supply may vary considerably. This is required for the regulation of the X-ray output of hot-cathode tubes, and for maintaining the X-ray output constant when the voltage and/or frequency of the mains supply may be liable to variation due to causes outside the control of the user of the X-ray apparatus.

In connection with the study of polished glass surfaces the important discovery has been made that the effect of polishing the surface of any glass, almost without exception, is to raise the refractive index of the immediate surface layer. The effect is most marked with certain flint glasses, the polished surface of which may have a refractive index as much as 0.04 higher than the refractive index of the body of the glass. This important observation should give considerable information about the mechanism of polishing. The investigation is being continued in this direction. Considerable progress has been made in the direction of developing a method of producing scales and graticules on glass by photographic method. A grainless photographic emulsion capable of giving great opacity has been worked out by the Association. Used with a lens capable of giving the requisite resolution, this emulsion should enable scales or graticules to be produced by photographic reduction from large drawings. The Association has dealt with a number of problems needing rapid solution for overcoming difficulties encountered in the manufacture of instruments. These have covered a very wide range, having included, amongst others, problems connected with valves, compasses, paints, cements for glass surfaces, and corrosion of metal components of instruments which occurred during manufacture.

Paint Research

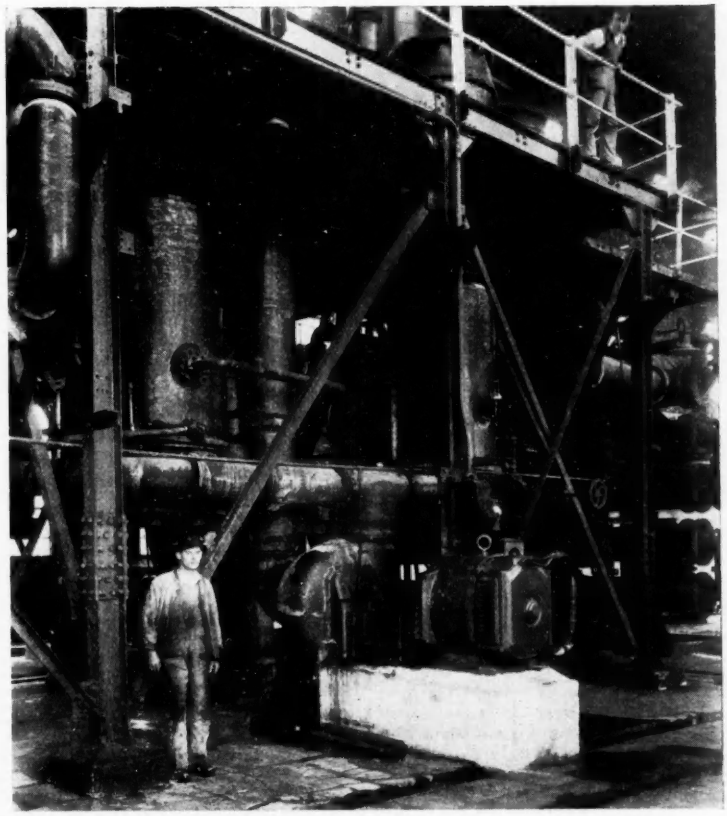
The outstanding feature of the work of the Research Association of British Paint, Colour and Varnish Manufacturers is concerned with the practical methods developed for the measurement of colour and the determination of colour fastness of pigments. In a recently published paper a new method of specifying the fastness of pigments to light has been described, together with schemes for making the necessary colour measurements and with an indication as to how these proposals may be immediately utilised by those interested in colour work. With the active co-operation of the British Colour Makers' Association, a table of fastness has been prepared based on the quantitative methods developed, and this table is being rapidly accepted by the industry as the basis of colour evaluation of pigments. The combination of defined conditions as adopted at the Association's Research Station is necessarily somewhat arbitrary, but they have been chosen after many trials to give results likely to approximate to normal experience. It is claimed that no difficulty will be found in correlating such results with the results obtained under other defined conditions if it is desired to make such comparisons. In addition, the scheme of work makes it possible to study and evaluate change of hue as well as the rate of fading, and so to obtain information as to the nature and extent of the differences between various specimens of similar colours by the study of the absolute colour measurements.

Some attention has been paid to the surface activity and surface characteristics of pigments in general, a matter which is of great importance in determining pigmentary properties. The most convenient material for investigation has proved to be the precipitated iron oxides, which are important articles of commerce and are being used in increasing quantity. The value of iron oxide as a pigment depends upon its colour, staining power, and some other factors, best described collectively as the paint-making property, which depend chiefly upon the degree of reactivity shown between pigment and oil medium. Scientifically it may be said that these factors are determined by the surface characteristics of the pigments, and it was felt that X-ray methods of investigation might elucidate the connection between crystal structure of different iron oxides and their pigmentary value.

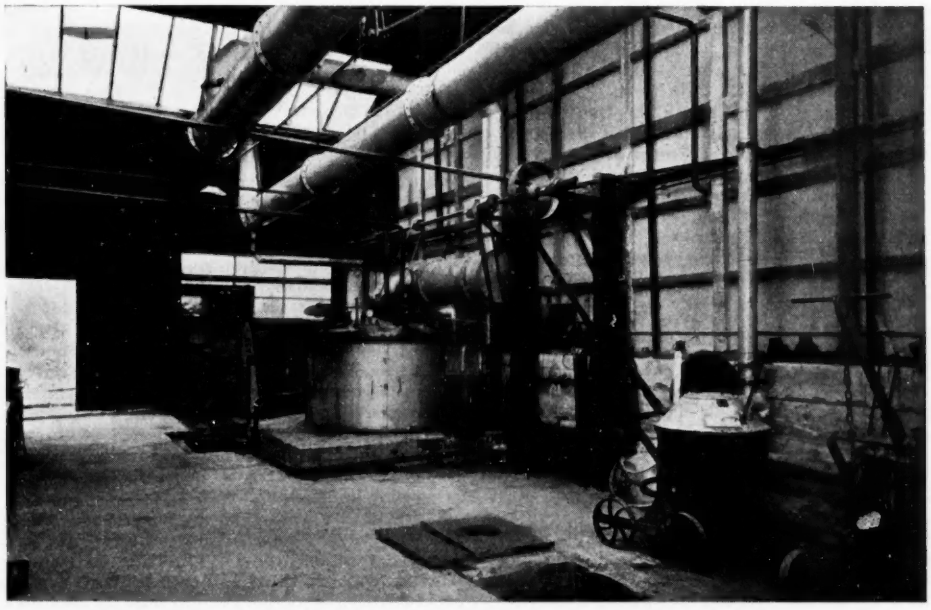
As it is usual in commercial production to subject iron-oxide pigments to a heat treatment process, it was arranged to examine a series of products obtained as a result of heating precipitated iron oxides to different temperatures for different times. The X-ray examination was carried out at the National Physical Laboratory. The general result of this investigation is to show that the structure developed by the iron oxide is very sensitive to comparatively small changes in the degree of heat treatment, and up to a point these changes may be correlated with pigment property. Other X-ray investigations have been made into lithopones, various mechanical mixtures of barium sulphate, titanium oxide and co-precipitated products have painting properties very different from the equivalent mechanical mixtures, although the X-ray patterns do not differentiate between the two. It is quite possible that the X-ray figures are confused through the growth of crystal size at certain stages of the process in the case of barium sulphates, and diminution of crystal size in the case of titanium oxide, as a result of heating.

New Uses for Wool

The Wool Industries Research Association's search for new uses for wool led to an attempt to treat wool yarns with nitrocellulose and cellulose acetate in order to produce new effects other than those obtained by mechanical admixture of Rayon fibres. With a mixture of cellulose, leather, rubber and wool,



MULTIPLE-EFFECT KESTNER PATENT SALTING TYPE EVAPORATOR WITH FORCED CIRCULATION.
(KESTNER EVAPORATOR AND ENGINEERING CO., LTD.)



A COMPLETE INSTALLATION FOR ESTERIFICATION AND GUM-RUNNING.
(ALUMINIUM PLANT AND VESSEL CO., LTD.)

all in suitable form, various products were made which strongly resembled leather. After laboratory experiments were complete, bulk samples were tried out, and at the present time the various uses to which these can be put, namely, gloves, manufacture of boot uppers, leather coats with wool linings complete, upholstery, etc., are all being explored. Wool has been found to present peculiar characteristics rendering it specially suitable for these purposes, and although a special fabric treatment is involved, the Research Association's workers have now succeeded, in co-operation with various practical agencies, in overcoming a great number of the difficulties originally presented.

A new process has been successfully launched on a mill basis for the bleaching of wool. As a result of the pure chemical research carried out on the action of sulphur dioxide upon dyestuffs, it has been shown that the cause of hitherto mysterious off-shade effects, due to what eventually proved to be contact with sulphur fumes, is the existence of an " active range " in the relative amounts of sulphur dioxide and alkali brought into contact with the dye. This effect is due in some cases to formation of addition compounds which are much lighter in colour than the original dye, and in other cases to actual reduction of the dyestuff. " Active range " conditions have produced a type of bleach, one important characteristic of which is its relative permanence to washing.

Treatment of Leather

Research on " red heat " in hides and skins has been continued by the British Leather Manufacturers' Research Association, and the effect of the addition of sodium fluoride to the curing salt has been studied. The addition of the sodium fluoride appeared to restrict the growth of the organisms of " red heat," but did not appear to have any deleterious effect on the fibre-structure of the hides and skins. The work on the disinfection of dry hides and skins infected with anthrax by means of warm sulphide-lime liquors, has been further developed and the method of disinfection has now reached the stage when it can be used by any tanner as a routine method of liming his goods and at the same time sterilising them against anthrax.

The Hydrogenation of Adsorbed Ethylenic Hydrocarbons

By Dr. A. Schuster

Grassi, and especially Pease and Rideal, in their studies of ethylene hydrogenation, have observed the total process composed of diffusion adsorption, desorption, and the actual catalytic processes in the adsorption layer, but Dr Schuster, of Ludwigshafen a.Rh., has investigated the processes in the adsorption layer itself in order to carry the matter one step forward. This article was a contribution to the general discussion on " Adsorption of Gases " at the Faraday Society's meeting held at Oxford, January 12-13.

ACTIVE charcoal possesses strong adsorptive powers for ethylene and ethane, more generally for unsaturated and saturated aliphatic hydrocarbons, and a markedly weaker but still measurable adsorptive capacity for hydrogen. Adsorbed olefine is hydrogenated by adsorbed hydrogen in a hydrogen atmosphere. The hydrogenated product remains adsorbed on the surface whilst new hydrogen enters the surface from the gas phase. The decrease of hydrogen pressure in the gas phase is therefore a measure of the hydrogenation of olefine occurring at the surface. With surfaces moderately covered, the adsorption of ethylene and ethane occurs with a differential heat of adsorption of 7,500 cals. per mol. Only when the surfaces are relatively bare are the differences in the adsorption heats of saturated and unsaturated hydrocarbons considerable. Ethylene has then a heat of 16,000 cals., and ethane 10,000 cals. With other substances having extended surfaces, e.g., silica gel, aluminium oxide, Florida earth, the adsorption of the saturated hydrocarbon is markedly inferior to that of the unsaturated.

Hydrogen adsorption at 0° C. on active charcoal follows a linear isotherm over a wide pressure range; with surface relatively bare, the adsorbed amounts increase with increasing temperatures with increasing curvature of the isotherms in the first stages of adsorption; with increasing temperature an adsorption process of another kind more and more intrudes as is characteristic for hydrogen adsorption at metal surfaces. For surface areas more completely covered the temperature coefficient of hydrogen adsorption is very small, so that a heat of adsorption of only about 1,000 cals. would be involved.

Hydrogenating Capacity of Charcoals

Ethylene, adsorbed on active charcoal, is hydrogenated in a hydrogen atmosphere in such a manner that, at 0° C., the velocity of reaction, as measured by the fall in hydrogen pressure, is representable as a first order reaction. The velocity of hydrogen consumption is dependent on the ethylene concentration in the surface, for each individual experiment as well as for the different degrees of surface covered with ethylene for the varying initial hydrogen pressure. With constant hydrogen pressure, the reaction is zero; with very low ethylene surface concentrations the velocity is dependent on the ethylene concentration. Adsorbed ethane does not inhibit the reaction.

Active charcoals of different sorts and different modes of preparation possess hydrogenating capacity for olefines. Their capacities, as with other hydrogenating agents, can be measured and characterised by the constants of the velocity of hydrogenation of an adsorbed ethylene layer. The hydrogenation capacity is dependent on the degree of evacuation of the surface. Unactivated charcoals, ordinary wood charcoals, only attain a hydrogenating capacity when upon their surface small amounts of hydrogenating metals are deposited. They share this behaviour with other large surface materials, such as silica gel, Florida earth, etc. On such contact masses the order of reaction is as described above, and the activation energy is of the same order of magnitude.

The study of the hydrogenation of different olefines on the same contact mass (1 per cent. Ni on active charcoal) shows that with increase of hydrocarbon molecule the relations vary somewhat. Propylene behaves like ethylene. The order of reaction is the same, but the hydrogenation is much slower than in the case of ethylene. Thus, for a definite quantity of hydrocarbon, the half-life at 0° C. for ethylene is eight minutes, for propylene it amounts to 104 minutes. The activation energy for propylene is 4,800 cals., while for ethylene on the same surface it amounted to 3,600 cals. With the three butylenes the activation energies are: α-butylene 6,800 cals.; β-butylene 5,600 cals.; *i*-butylene 6,400 cals., while the half-life periods are: α-butylene 228 minutes, β-butylene 485 minutes, and *i*-butylene 1,100 minutes.

Catalytic Reaction Independent of Temperature

For the uncatalysed hydrogenation reaction the activation energy can be estimated from present knowledge to be between 40 and 50 cals. There is therefore a quite extraordinary diminution of activation energy due to the catalyst without the adsorption experiments yielding heats of adsorption of a similar order of magnitude as have hitherto been observed. Here there is, therefore, a case in which the catalytic reaction is practically independent of temperature, without the energy quantities necessary for the reduction of the activation energy being otherwise observed. This suggests the idea that the elementary process in the catalytic hydrogenation of ethylene on the given surface is conditioned by the so-called " Born-Franck mechanism." The average life of the ethylene molecules on the surface is of the order of minutes. During this time-interval, the molecule is continuously in the neighbourhood of adsorbed hydrogen molecules and the system of the two adsorbed reaction partners degenerates into the desired reaction product. In such cases, quantum mechanics has shown that there is a certain finite probability of escape through the energy barrier without the necessary energy increment. The methods utilised by Born and Weisskoff for the quantitative formulation of this transition probability can be carried over to the present case also and lead, with certain assumption as to the dimensions of the reacting molecules, to plausible results.

Extended Programme of Fuel Research Work

The By-Products of Coal

Last week we gave a summary of the first part of the Report of the Fuel Research Board for the year ended March 31, 1931, issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, price 2s. net). Following is the completion of our review of this Report, which includes an account of the extended programme of work which has been approved.

On the cessation of the Richmond experiment, the Director of Fuel Research was asked to prepare a scheme for more intensive work at the Fuel Research Station, both on the development of retorts for the low temperature carbonisation of coal and for the study of methods of improving the tars produced. The following programme was accordingly prepared, and approved in principle by the Government, as stated by Mr. Charles Edwards, on behalf of the Secretary for Mines, in the House of Commons on May 5, 1931. The programme is based on the assumption that the policy should be for the Fuel Research Station to continue to develop plant up to a small commercial scale, and that a programme of development work could be pursued steadily over a period of years.

It is proposed to erect two intermittent vertical gas ovens of the latest commercial type; these are normally worked at temperatures of over 1,000° C., and their products, both at normal and reduced temperatures, will be compared with those from the brick retorts mentioned above. By this means the range of carbonisation temperatures between 600° C. and 1,000° C., i.e., that intermediate between those used in current practice in "low temperature" carbonisation and in gas retorts, will be explored so as to find the optimum conditions of working in various circumstances. This equipment will have a throughput of some 25-30 tons of coal a day, and will provide a supply of tars of known origin for the further experiments on tar. On the tar treatment side the programme provides for the investigation of (a) "hydrogenation," (treatment with hydrogen in the presence of catalysts at high pressures); (b) "cracking," (treatment with or without catalysts and hydrogen at atmospheric or comparatively low pressures); and (c) treatment of the tar vapours from the retorts *before* condensation. The plant will necessarily include provision for the distillation and refining of the various tars and oils, and for the recovery of hydrogen from the gases leaving the hydrogenation plant.

Hydrogenation of Coal

The last annual Report contained, in an appendix, a summary of the work carried out on hydrogenation during the past few years. Hydrogenation consists in treatment with hydrogen under high pressures and at temperatures in the neighbourhood of 450° C., and can be applied to coal, or to oils and tars. The hydrogenation of coal results in the conversion of the coal substance into oily or tarry liquids to a greater extent than any other known process. The hydrogenation of tars may result in the production of a large proportion of light spirits and the conversion of the phenolic bodies and of the pitch into more useful compounds. The work on the hydrogenation of tars has already been dealt commented upon. The original Bergius process, as described in previous Reports, produces a liquid which is a rather tarry material, in that it contains a considerable percentage of pitch. The investigations on the hydrogenation of tars have therefore an important bearing on the hydrogenation of coal as showing how the primary products can be improved, either by modification of the process or by re-treatment.

During the year an extension has been made to the accommodation available, and a small new building has been erected alongside that housing the old Bergius plant. There are now five 2-litre convertors available for static experiments, four of which can be under heat at the same time. The two high-pressure benzene extractors, the pyridine extractor, and the small continuous plant for the hydrogenation of tar are also controlled from the new building. A slight modification has also been made to some of the 2-litre convertors in order to obtain better mixing of the contents when working with a fluid material. This consists of an eccentric bearing at one end, so that the convertor is given a rocking as well as a rotary motion. This also eliminates to some extent the effect of temperature differences between the middle and ends of the converters. Up to the present these 2-litre converters have been heated by open gas flames, and this method has given generally satisfactory results. In order to obtain a more uniform temperature throughout the reaction space without the attendant risk of overheating the heavy flanged ends, it is proposed to convert some or all of the convertors to electrical heating; an experimental furnace has been made up and tested, and the construction of the first working furnace has been put in hand.

A few more experiments have been made in the continuous plant using specially clean coal, but the main work during the past year has consisted in the study of the action of various catalysts. For this purpose the small converters were used. A method has been evolved which can be quickly and easily applied and which gives a good indication of the relative suitability of the catalysts for the object in view, and by this means it has been possible to examine a far larger number of catalysts than would have been possible in the time if a full examination had been made of all the products. Further work has also been carried out on the modified hydrogenation process mentioned in an appendix to the last annual Report, in which a rapid stream of hydrogen was passed over coal maintained at 430° C., and oil amounting to 69 per cent. of the ash-free dry coal was condensed out from the gas stream. This oil has been submitted to re-processing in the presence of catalysts and a yield of spirit of boiling point up to 230° C., amounting to 125 gallons per ton of coal substance has been obtained.

"Partial" Hydrogenation

The examination of the products of "partial" hydrogenation has been continued during the past year, and in addition to the extraction of two coals and their partially hydrogenated products with pyridine, the results of which were given in the last annual Report, the same coals and products have been examined by extraction with benzene under pressure. The scheme of separation of the benzene-soluble extract was similar to that put forward by W. A. Bone, L. Horton and L. J. Tei (*Proc. Roy. Soc. A.*, 1928, *120*, 523), which consists in the division of the extract into five fractions, known as fractions Ia, Ib, II, III and IV, by means of solubilities in certain solvents in a given order.

In the following table are collected the results of the extraction of "Tydraw" coal and its partially hydrogenated product obtained by the reaction of the coal with 0.4 per cent. of its weight of hydrogen:—

Fraction	Ia	Ib	II	III	IV
Coal	0.13	0.15	0.22	0.02	0.06
Partially hydrogenated product	2.23	3.08	3.53	0.05	4.67

The figures for the coal are expressed in percentages of the dry coal whilst those for the product are corrected to percentages of dry coal to make allowance for the decrease in weight that takes place during partial hydrogenation. A comparison of the analyses of these fractions as far as has been possible has shown a similarity between the fractions from the coal and those from the product.

Professor Bone's work has indicated that the fraction IV constituents in coal appear to be largely responsible for the coking properties of a coal. The fact that partial hydrogenation of the above coal, itself non-coking, has given rise to a strongly coking product, and at the same time to a large increase in the amount of fraction IV, similar in properties to that from the coal, suggests that the coking properties of the product are due to the formation by hydrogenation of quantities of fraction IV.

Sulphuric Acid in Japan

At present Japan is entirely self-sustaining in its requirements for sulphuric acid, although the demand for the product has grown enormously in recent years, having doubled since 1927. The production of sulphuric acid during 1929, the last year for which official statistics are available, was 1,144,003 metric tons compared with 613,342 for the previous year.

The Adsorption of Gases by Solids

By Hugh S. Taylor

The following extracts are taken from the opening contribution to the General Discussion on "Adsorption of Gases" at the meeting of the Faraday Society, held at Oxford, January 12-13.

FARADAY'S emphasis on the "superficial actions of matter" became overlaid by the considerations of "porosity" in connection with the properties of adsorbent materials. There emerged the hypothesis of capillary condensation which accounted for the observed adsorption in terms of liquid condensed in pores of the solid owing to the lowering of vapour pressure caused by surface tension effects. Adsorption at plane surfaces should be impossible on this basis, nor should gases be adsorbed at temperatures above the critical temperatures. Nevertheless in spite of much argument to the contrary, this "pore" concept still persists in certain quarters.

Since the time of de Saussure (1814) it has been assumed that adsorption occurred in thick compressed films the existence of which was to be associated with long range forces of attraction extending outwards from the solid surface with progressively diminishing potential. It was by diffusion through such thick layers of adsorbed gas that Bodenstein, Fink, Stock and others assumed that reacting gases in heterogeneous gas reactions reached a reaction surface on which the velocity of interaction was relatively rapid. Langmuir, in 1915, emphasising the unsaturated nature of surface atoms in a solid lattice and, at the same time, the extremely short range of inter-atomic and molecular forces simultaneously provided adsorption with the "unimolecular adsorption layer" and the heterogeneous reactions with a kinetics based on the extent to which a surface is bare or covered with unimolecular layers of adsorbed gas. So far as kinetics is concerned, acceptance of the Langmuir concept may be characterised as universal. As to adsorption, one can summarise the situation by saying that the thick compressed film has during the last decade become progressively thinner until now the tendency is to reinterpret the ideas of the compressed film in terms of the unimolecular layer.

Mobility of Adsorbed Gases

The brilliant experimental investigations of Volmer and his collaborators served to show that an adsorption layer on a surface might be extremely mobile and that the transfer of matter via such a mobile adsorbed film might be as much as 18,000 times greater than that occurring through free evaporation into the air. This mobility effectively provides a mechanism whereby the areas of a surface having the highest heats of adsorption become covered with adsorbed gases before the surfaces of lesser activity. The saturation of such areas does not need to be attained by condensation processes alone but may be assisted by this two-dimensional motion parallel to the surface. It is a probable assumption that the mobility of adsorbed gases will be correspondingly less on the areas of stronger binding energies. Indeed, there is reason to believe that the two-dimensional motion may be limited to adsorption processes involving only the van der Waals' forces and that polar binding to the surface entirely suppresses any lateral motion.

In this respect a recent study by Kautsky (*Ber. d. chem. Ges.*, 1931) of hydrogenation of methylene blue at platinum areas sparingly distributed over surfaces of silica and thoria gels, is of great interest. Polar adsorption of the dyestuff by the thoria restricted its access to the platinum centres and so slowed down hydrogenation in comparison with the velocity when silica was used as the platinum support. Silica does not absorb the dyestuff in a polar manner.

Nature of the Adsorption Process

In what has preceded it has been tacitly assumed that only one adsorption process is occurring with a given gas and a given surface. Evidence is accumulating rapidly that this is not necessarily universally true. Even in the older literature there is sporadic evidence that more than one type of binding may be involved in an association of gas and surface. Dewar showed that the adsorption of oxygen on charcoal at liquid air temperatures involved a heat of binding of 3744 calories and that the oxygen was readily recoverable by pumping. At 0° C., Keyes and Marshall found a heat of adsorption of 72,000 calories for the first gas adsorbed and a difficult recovery mainly as oxides of carbon. Langmuir found that carbon monoxide was absorbed by platinum and readily removed at liquid air temperatures, but was relatively irreversibly adsorbed at room temperatures and higher. Langmuir also found that the amount of oxygen adsorbed at liquid air temperatures by platinum was only one tenth of that at room temperatures and that adsorbed in the higher temperature range is only removable by reaction with other gases.

Benton and White have shown similar behaviour with hydrogen on copper and nickel, the low temperature adsorption being small and involving low binding energy, the high temperatures being greater and involving high heats of adsorption. The same is true for carbon monoxide on palladium (Taylor and McKinney) for hydrogen and carbon monoxide on zinc chromium oxides (Garner and Kingman), manganous and manganous chromium oxides (Taylor and Williamson), and zinc oxide (Taylor and Sickmann).

Activated Adsorption

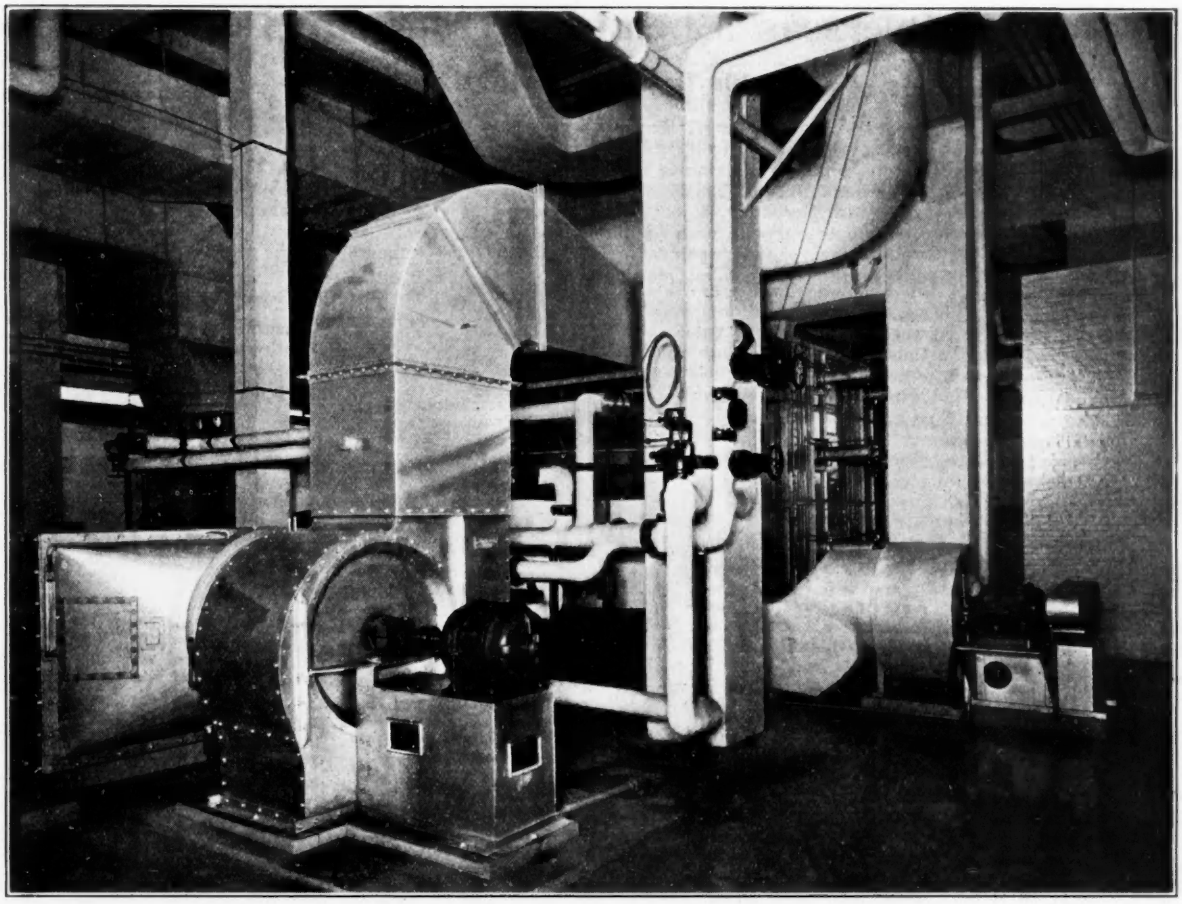
About a year ago the author (*J. Am. Chem. Soc.*, 1930, *52*, 5208; 1931, *53*, 578), called attention to the experimental fact that these high temperature adsorption of gases with high binding energies were also processes occurring with measurable velocities. Furthermore, the velocities increased with increase of temperature in a manner familiar to students of chemical kinetics, the adsorption process occuring as though it involved an activation energy. For this reason this type of adsorption was designated "activated adsorption." It was shown that the concept of activation energy for such adsorption at once provided an explanation for the absence of such adsorptions at low temperatures, the temperature at which the activated adsorption becomes manifest being a function of the magnitude of the activation energy and characteristic for a particular surface—gas mixture. Thus, with hydrogen and the metals copper and nickel, activated adsorption sets in around liquid air temperatures. With zinc oxide, manganous oxide, and mixtures of these with chromium oxide activated adsorption of hydrogen becomes measurable in the interval 0°-100° C. With alumina and glass such activated adsorption of hydrogen is not manifest until temperatures in the neighbourhood of 400° C. are reached.

Velocity of Adsorption

The experimental evidence with respect to velocity of adsorption is now sufficiently good that a decision can be reached as to the method whereby the adsorbed gas receives the activation energy required for the activated adsorption. Thus, data of Taylor and Sickmann on the adsorption of hydrogen by zinc oxide at 184° C. indicate that, on 20 grams of the oxide, 7.7 c.c. of hydrogen measured at N.T.P. were adsorbed in one hour, the activation energy of the process (deduced from the temperature coefficient in the range 132° to 184° C.) amounting to some 13,500 calories per mol. It is quite evident from a simple calculation that this adsorption is *not* to be accounted for on the assumption that adsorption occurs when gas molecules with an energy equal to 13,500 calories per mol. strike the surface. Kinetic theory teaches that the number of such molecules striking the surface per unit area per second is approximately

$$\tfrac{1}{4}N/v\bar{w}e^{-13500/RT}$$

where N/v is the number of molecules per c.c., $\bar{w}$ the root mean square velocity of the molecules. For the case in point, this equation gives a value of $\frac{1}{4}\times 3\times 10^{19}\times 2.5\times 10^{5}\times e^{-15}\times 60\times 60$ molecules per sq. cm. per hour or approximately 2×10^{21} molecules *per sq. cm.* per hour. This is some ten times the amount actually taken up by the *whole* zinc oxide surface in the time interval in question. One must conclude, therefore, that the molecules receiving the necessary activation energy are first adsorbed on the surface and obtain the energy required from the surface.



Air dehydration is satisfactorily effected by the use of silica gel. The air is passed through adsorbers containing beds of the gel which removes moisture, impurities and odours. When the gel is saturated a current of hot air is passed through these adsorbers to drive off the adsorbed moisture and impurities, reactivating the gel so that it is again ready for use. In practice the adsorbers are installed in series, so that the dehydrating process may be carried on continuously. The above illustration shows part of a large air dehydration plant erected by Silica Gel, Ltd. The general accessibility of the fans, air ducts and pipework is an outstanding feature of this installation.

British Disinfectant Manufacturers' Association

Second Year's Progress

THIS new Association has continued to grow steadily during the second year of its existence and now includes every disinfectant manufacturer of importance in the country. It can thus speak with authority for the disinfectant trade. Its main activities have been in connection with the standardisation of a bactericidal test for controlling deliveries of disinfectants under contract and with the preparation of a standard specification for lysol. Prolonged discussions with a Government Committee representative of the main disinfectant using departments have been unable to reconcile the wide divergence of opinion that exists on the subject.

Certain departments still insist on their adherence to the Martin Chick tests in spite of the admitted defects of this method and will not consider any alternative. The Service Departments and the India Office had, however, a more accurate appreciation of the real point at issue and accepted the views of the British Disinfectant Manufacturers' Association that the Rideal Walker method should be the basis of the standard test, and that subject to consideration of a few points of detail, the technique which the British Disinfectant Manufacturers' Association had elaborated and tested with such great care should be adopted. The final revision of the technique will shortly be completed, after which the widest publicity will be given to the test, and its adoption as a standard method will be urged on all users of disinfectants throughout the world.

The lysol makers' section of the Association has been most fortunate in securing the wholehearted co-operation of the Pharmaceutical Society and the Pharmacopœia Commission in drafting of a standard specification for lysol. A suitable specification, which the Central Midwives Board will recognise, has been prepared and will appear in the new issue of the Pharmacopœia Commission in the drafting of a standard owing to the alleged unsatisfactory nature of certain lysols and lysol solutions on the market should now disappear, and the consumer will be guaranteed an efficient product.

The Association has kept a close watch on all new legislation likely to affect the disinfectant industry and has made appropriate representations when necessary. It has also given its cordial support to the movement which has resulted in the formation of the British Standards Institution.

At the annual general meeting in March the following were re-elected officers for the current year:—Chairman: Mr. N. F. Kingzett, of Sanitas Co., Ltd.; vice-chairman: Mr. W. H. Hivey, of Taylors Automatic Disinfector, Ltd.; hon. treasurer: Mr. R. A. Blair, of Burt, Boulton and Haywood, Ltd.

British Overseas Chemical Trade in December

Notable Increase in Re-Exports

EXPORTS of chemicals, drugs, dyes and colours during December amounted to a total of £1,321,559, which is £196,865 lower than in December, 1930. Imports totalling £1,212,953 were higher by £75,721, and re-exports amounting to £249,589 were higher by £176,993, as compared with December, 1930.

The statistics for exports and imports during each of the past twelve months are set out below, showing percentage fall or rise calculated on figures for the corresponding months of last year:—

	Jan.	Feb.	Mar.	Apr.	May	June
Exports	– 36.5	– 40.5	– 30.5	– 19.4	– 15.4	– 10.0
Imports	– 22.7	– 11.3	– 13.2	+ 4.8	– 16.4	– 7.8
	July	Aug.	Sept.	Oct.	Nov.	Dec.
Exports	– 21.5	– 26.3	– 24.7	– 24.9	– 6.8	– 12.3
Imports	– 11.4	– 11.5	– 1.1	+ 26.8	+ 114.3	+ 6.7

For the twelve months of this year exports have dropped £4,915,154 and imports have risen £298,668 in comparison with figures for the corresponding period of 1930.

	Quantities. Month ended December 30. 1930.	1931.	Value. Month ended December 30. 1930.	1931.
Imports				
CHEMICAL MANUFACTURES AND PRODUCTS (other than Drugs and Dye-stuffs)—			£	£
Acetic Anhydride cwt.	—	—	—	—
Acid, Acetic .. tons	594	873	21,933	31,903
Acid, Tartaric, including tartrates, cwts.	5,869	1,984	28,705	7,170
Bleaching materials ,,	9,513	5,326	10,364	12,887
Borax .. .. ,,	23,535	39,873	14,283	22,052
Calcium Carbide ,,	106,797	108,846	66,784	67,606
Coal tar products, not elsewhere specified	—	—	16,852	3,854
Glycerine, Crude cwt.	95	278	188	375
Glycerine, Distilled ,,	2,384	1,488	5,251	3,240
Red Lead and Orange Lead .. .. ,,	4,572	5,270	6,167	7,668
Nickel Oxide .. ,,	—	437	—	2,349
Potassium Nitrate (saltpetre) .. cwt.	5,003	5,433	4,986	5,071
Other Potassium Compounds .. cwt.	164,905	174,795	58,067	66,283
Sodium Nitrate ,,	127,660	97,475	54,472	32,221
Other Sodium Compounds .. cwt.	29,420	28,804	20,012	25,013
Tartar, Cream of ,,	3,652	2,428	15,255	9,333
Zinc Oxide .. tons	571	314	14,558	6,348
All other sorts .. value	—	—	219,452	311,080
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	109,880	158,350	7,510	14,293
Bark Cinchona (Bark Peruvian, etc.) cwt.	3,921	465	18,648	2,155
All other sorts .. value	—	—	203,664	115,355
DYES AND DYE-STUFFS—				
Intermediate Coal Tar Products .. cwt.	71	183	784	2,238
Alizarine .. ,,	57	—	2,926	—
Indigo, Synthetic ,,	—	20	—	149
Other sorts .. ,,	3,011	5,605	65,642	130,610
EXTRACTS FOR DYEING—				
Cutch .. .. cwt.	2,354	1,904	3,966	2,883
All other sorts .. ,,	2,776	4,822	9,919	16,275
Indigo, natural ,,	7	5	200	85
Extracts for Tanning (solid or liquid) cwt.	99,884	165,673	100,012	129,632
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground cwt.	37,906	39,313	7,175	7,720
White Lead (dry) ,,	12,857	10,329	19,208	15,234
All other sorts .. ,,	109,036	111,432	140,249	161,871
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	1,137,232	1,212,953
Exports				
CHEMICAL MANUFACTURES AND PRODUCTS (other than Drugs and Dye-stuffs)—			£	£
Acid, Sulphuric cwt.	16,032	4,125	4,787	2,137
Acid, Tartaric, including Tartrates .. cwt.	1,821	651	9,818	3,696
Ammonium Chloride (Muriate) tons	211	491	3,357	7,285
Ammonium Sulphate—				
To Spain and Canaries tons	7,353	13,059	51,458	68,455
,, Italy .. ,,	226	—	1,615	—
,, Dutch East Indies tons	4,453	—	32,957	—
,, China (including Hong Kong) tons	3,598	3,445	26,965	19,105
,, Japan .. ,,	1,000	15,179	7,500	77,446
,, British West India Islands and British Guiana tons	512	846	3,718	4,493
,, Other Countries tons	16,331	7,699	115,296	39,954
Total .. ,,	33,473	40,228	239,509	209,453
Bleaching Powder (Chloride of Lime) .. cwt.	37,903	35,129	11,929	11,008
COAL TAR PRODUCTS—				
Anthracene .. cwt.	—	8	—	7
Benzol and Toluol galls.	4,035	4,267	390	311
Carbolic Acid (crude)	1,488 cwt.	715 galls.	1,969	114
Carbolic Acid (crystals)	3,573 cwt.	749 cwt.	9,231	1,895
Cresylic Acid ..	101,334 galls.	86,540 galls.	10,931	9,297
Naphtha .. galls.	3,267	3,212	334	298
Naphthalene (excluding Naphthalene Oil) cwt.	3,186	5,551	1,109	1,163
Tar Oil, Creosote Oil, etc. galls.	1,443,461	243,805	33,242	4,041
Other sorts .. cwt.	11,071	13,490	5,903	9,234
Total .. value	—	—	63,109	26,360
Copper, Sulphate of tons	2,738	2,294	50,109	37,394
Disinfectants, Insecticides, etc. .. .. cwt.	32,289	31,964	78,952	70,629
Glycerine, Crude .. cwt.	902	2,121	1,445	2,250
Glycerine, Distilled ,,	10,196	9,924	25,899	21,040
Total .. ,,	11,098	12,045	27,344	23,290
POTASSIUM COMPOUNDS—				
Chromate and Bichromate .. .. cwt.	1,457	1,090	2,986	2,486
Nitrate (Saltpetre) ,,	671	1,057	1,278	1,710
All other compounds ,,	1,425	3,903	8,240	7,310
Total .. ,,	3,553	6,050	12,504	11,515
SODIUM COMPOUNDS—				
Carbonate, including Soda Crystals, Soda Ash and Bicarbonate cwt.	335,143	244,407	80,628	60,503
Caustic .. .. ,,	150,165	133,353	96,323	86,342
Chromate and Bichromate .. .. cwt.	2,718	1,574	4,314	2,943
Sulphate, including Salt Cake .. .. cwt.	83,923	78,420	10,066	8,620
All other compounds ,,	31,208	48,840	51,833	50,866
Total .. ,,	603,157	506,594	252,164	218,274
Zinc Oxide .. tons	239	508	6,439	10,179
All other sorts .. value	—	—	217,665	212,272
Total .. ,,	—	—	977,686	843,492

	Quantities. Month ended December 30. 1930.	1931.	Value. Month ended December 30. 1930.	1931.
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	82,839	97,968	9,475	13,006
All other sorts .. value	—	—	214,283	196,504
Total .. ,,	—	—	223,758	209,510
DYES AND DYE-STUFFS—				
Products of Coal Tar cwt.	8,932	9,071	79,252	83,985
Other sorts .. ,,	14,638	11,220	13,935	7,913
Total .. ,,	23,570	20,291	93,187	91,898
PAINTERS' COLOURS AND MATERIALS—				
Barytes, Ground cwt.	7,254	762	1,227	290
White Lead (dry) ,,	1,852	1,616	3,243	2,527
Paints and Colours in Paste Form .. cwt.	29,122	21,593	54,738	35,941
Paints and Enamels prepared .. .. cwt.	33,210	26,744	102,635	76,274
All other sorts .. ,,	32,313	36,866	62,950	62,627
Total .. ,,	103,751	87,581	224,793	177,659
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	1,519,424	1,322,559
Re-exports				
CHEMICAL MANUFACTURES AND PRODUCTS (other than Drugs and Dye-stuffs)—				
Acid, Tartaric, including Tartrates .. cwt.	42	54	262	371
Borax .. .. ,,	100	73	66	57
Coal Tar Products, not specified .. value	—	—	21,767	19
Potassium Nitrate (Saltpetre) .. cwt.	36	95	51	130
Sodium Nitrate ,,	1,858	908	849	384
Tartar, Cream of ,,	443	226	2,053	1,141
All other sorts .. value	—	—	15,088	189,954
DRUGS, MEDICINES, ETC.—				
Quinine and Quinine Salts .. .. ozs.	8,568	8,460	878	1,064
Bark Cinchona (Bark Peruvian, etc.) cwt.	28	205	94	2,134
All other sorts .. value	—	—	26,354	42,362
EXTRACTS FOR DYEING—				
Cutch .. .. cwt.	423	534	698	1,059
All other sorts .. ,,	126	85	387	387
Indigo, Natural ,,	—	—	—	—
Extracts for Tanning ,,	1,141	1,215	1,436	1,520
PAINTERS' COLOURS AND MATERIALS .. cwt.	1,736	2,340	2,568	3,371
Total of Chemicals, Drugs, Dyes and Colours .. value	—	—	72,596	240,589

Restrictions on Foreign Exchange

A MEMORANDUM on foreign exchange restrictions, compiled by the Department of Overseas Trade, presents a summary of the various decrees and legal enactments promulgated in the countries concerned, as well as an indication of steps taken by banks in certain countries to control exchange operations. It is circulated for the information of United Kingdom exporters to enable them to see at a glance in what countries some form of restriction is in force and to give a general idea of the extent of the control.

The full texts of the decrees and orders on which this summary is based are, for the most part, available at the Department for consultation. In many cases they have already been circulated to firms on the Department's special register; and as additional information is received it will form the subject matter of future circulars. It should be borne in mind, states a circular sent with the memorandum, that in a number of the countries concerned conditions are still in process of change, and that therefore the memorandum cannot do more than indicate in its main outlines the position, according to the Department's information, at the date of its issue.

Confessions of a Capitalist

A New Twelfth Edition

SINCE the beginning of the century a vast literature has appeared on the supposed defects of the capitalist system. The case for individualism in business badly needed restating and the measure of the success of the publication of Sir Ernest Benn's "Confessions of a Capitalist" was shown by the sale of more than a quarter of a million copies of his book in English and by the publication of translations into six languages. A twelfth edition being now called for, "Confessions of a Capitalist" has been republished in the Essex Library (3s. 6d. net), with a new preface by the author.

The Essex edition offered to Sir Ernest Benn the opportunity to revise or rewrite, add to or delete from the original. He has come to the conclusion to leave it all as it was, and the reader will certainly agree with him that the argument is as good as ever. The scheme of the book is a simple one, as Sir Ernest Benn sets out to explain the workings of the capitalist system as illustrated by his own business. His chief confession is that he has an income of £10,000 a year, and he proceeds to tell the reader how he makes it and to defend the system under which it is made. The essence of his doctrine is that it is to the business man that we owe almost everything we possess in the material way. As he sees it, the only hope of securing better conditions or a higher standard of living, not only for the workers but for the people as a whole, is in the increasing encouragement of a competent class of business men working for the common good on competitive and individualistic lines. In particular he argues that far too much importance is given by thinkers on industrial questions to the making of things and far too little to exchange and distribution.

Many of Sir Ernest Benn's prophecies have come home since 1925. Seven years ago, for example, he wrote: "When I read of the politicians settling the unemployment problem, I only think of the large numbers who will be thrown out of work by any such plans." His chapter on taxation and public expenditure is as true to-day as when it was written, and if the politicians had drawn the appropriate lessons from it this country need not have been brought to the economic pass in which it finds itself at the present time. Among the public institutions which are now being brought under close scrutiny is the Post Office. Its critics were anticipated by Sir Ernest Benn, who pointed out that the service rendered by the Post Office would not stand comparison with the service rendered by private enterprise.

Here then is the classic example of the argument for private enterprise, in which Sir Ernest Benn is an unrepentent believer. He regards the whole movement of creating wealth by political agencies as a snare and a delusion, and the hard facts of the last few months have borne out the truth of everything he wrote in 1925. Strongly as "Confessions of a Capitalist" has already influenced public opinion, it has the prospect of even greater usefulness in its new form.

Overproduction of Mercury in Europe

THE European mercury market has been greatly affected by events in Spain and by the drop in sterling. Moreover, Mexico and Italy produce mercury outside the international cartel. The official quotation is £21, but Italian mercury is sold at £15. Following the fall of sterling, the cartel reduced the price to £16. At preesnt the stocks on hand consist of 200,000 bottles, whereas the annual consumption is only 90,000 bottles. The average production is about 5,000 tons, or 150,000 bottles. It is hoped that new uses for mercury will arise to serve as an outlet for these stocks. Aside from known uses, great hopes are founded on the utilisation of mercury in steam turbines.

Plans to Expand Use of Charcoal

PLANS for the publication of a bulletin to popularise the use of charcoal for industrial and domestic purposes are being carried forward by the director of the United States National committee on wood utilisation, in conjunction with Forest Products Chemical Co., of Memphis, Tenn., and several other manufacturers of wood chemical products. It is anticipated that profitable outlets can be developed for this by-product of wood distillation, and the status of the industry materially improved.

Coal Tar Acids in the United States

Influence of Synthetic Resin Industry

ALTHOUGH in the first stages of its development, the synthetic resin industry gives promise of becoming one of America's foremost activities. Because of their great utility and wide distribution, the importance of synthetic resins in everyday life is becoming more and more apparent. Their diversified uses, from bottle caps and radio parts to timing gears and furniture, as well as their employment in the automobile, structural, electrical and marine industries, and in the manufacture of varnishes and lacquers, are familiar to all. Not only are new uses being found for the older types of synthetic resins, but new materials from new sources are being added to the ever-growing list. The increased demand for synthetic resins, chiefly of coal-tar origin, is therefore primarily responsible for the unusually large consumption of both phenol and cresylic acid in recent years. In 1930 production of phenol alone amounted to over 21,000,000 lbs., worth more than $2,000,000.

Demand for Carbolic Raw Materials

Members of a homologous series of phenols, both phenol and cresylic acid, are found in coal tar, from which they are obtained by distillation and subsequent fractionation and purification. Phenol is also manufactured synthetically, using benzol as a basic material, the synthetic variety competing to-day with "natural" phenol. In addition to their employment in the manufacture of synthetic resins, both phenol and cresylic acid find use as ingredients of insecticides and disinfectants. Phenol is used also in the production of explosives and as an intermediate in the manufacture of coal-tar dyes, while important uses for cresylic acid are in the manufacture of tricresyl phosphate and as a flotation agent.

A domestic production in 1930 of more than 21,000,000 lb. of phenol, approximately 70 per cent. of which was synthetic, took care of home requirements; imports during that year amounting to only 500 lb. Total domestic cresylic acid requirements necessitated the importation in 1930 of over 10,000,000 lb. in addition to a domestic production of 17,300,000 lb. of the refined grade—distillates yielding, below 215° C., tar acids equal to more than 75 per cent. of the original distillate.

Although large stocks of phenol were on hand at the close of the World War—aggregating around 35,000,000 lb.—the steadily increasing demand gave rise to an increasing domestic production, reaching a peak in 1929. Coincident with an increased production there has been a lowering of imports. Statistical data for recent years is as follows:—

Year	Production (lb.)	Imports (lb.)
1926	8,601,181	218,437
1927	8,041,082	500
1928	10,227,489	1,653
1929	24,177,618	433,385
1930	21,147,436	500

Cresylic Acid Imports

Although domestic production of cresylic acid has increased in late years, it has been necessary to import this material in order to supply the larger consumption requirements. Imports are chiefly from the United Kingdom and Germany. The following table shows imports entered for consumption of (1) crude cresylic acid (free); (2) refined cresylic acid (cresol or liquid carbolic acid) (dutiable); and (3) ortho-cresol, meta-cresol and para-cresols, 90 per cent. or more pure (dutiable):—

Year	Crude acid (lb.)	Refined acid (lb.)	*o-m*-and *p*-acid (lb.)
1926	5,702,740	25,932	105,238
1927	9,136,516	610,488	174,094
1928	10,687,109	976,180	207,897
1929	17,856,765	2,343,529	227,974
1930	9,009,674	1,257,872	202,317
1931	2,488,398	404,350	90,602

A group of tar acids containing practically no phenol, small quantities of the cresols, and proportionately larger amounts of the xylenols is obtained from the tar produced by cooling the waste gases from blast furnaces or that produced during the thermal decomposition of coal in vertical retorts. Of late, the tar produced during the low-temperature carbonisation of coal has become another source of high-boiling phenolic or phenoloid bodies. Some of this type of phenols finds its way into commercial articles used in disinfection, markedly increasing their bacterial efficacy. Imports of "distillates of coal, blast-furnace, oil-gas, and water-gas tar," answering certain specifications as to boiling point and tar-acid content, practically have disappeared.

Imports into the United States for consumption of all other distillates, which yield in the portion distilling below 190° C. a quantity of tar acids less than 5 per cent. of the original distillate, show the following variations:—1925, 5,994,803 lb., $367,672; 1926, 3,136,838 lb., $197,009; 1927, 68,748 lb., $7,405; 1928, 530,641 lb., $26,001; 1929, 298,619 lb., $18,845; and 1930, 347,923 lb., $11,053. Preliminary data for the first half of 1931 are 186,921 lb., $6,728.

Exports of phenol have not been recorded since 1924. At that time outbound shipments went to 28 world markets, principally to Latin American countries. The United Kingdom, Canada, China and the Phillippines took small quantities. Cresylic acid exports are negligible, 1,039,532 lb., valued at $92,106, being exported in 1929, with the benefit of drawback.

U.S. Exports of Phenolic Synthetic Resins

Originally an American achievement, this country has contributed largely of its inventive genius and merchandising skill to the synthetic resin field. The pioneer type—the phenol-formaldehyde resins—was followed by the coumarone and indene resins, the urea and furfural products, the glytals and the "sulphur," resorcinol and vinyl resins. In 1930, synthetic resins of coal-tar origin reached a domestic production figure of over 30,000,000 lb., 20 times as much as in 1921, when 1,500,000 lb. comprised the United States output. Of the total 1930 production of coal-tar synthetic resins, 60 per cent. was derived from phenol and the creosols (cresylic acid). Imports of phenolic synthetic resins reached a peak in 1928 when 60,547 lb., valued at $10,984, were entered for consumption. The amounts dropped to 11,359 lb., $4,266, in 1929 but advanced again to 46,464 lb., $10,417 in 1930

An increased domestic production now permits the exportation of this class of products, outbound shipments of laminated sheets and plates and other coal-tar resin products going to 27 world markets, which in 1930 included Canada ($88,353); United Kingdom ($28,096); France ($23,424); Italy ($13,532); Germany ($4,615); Australia ($4,609); Cuba ($1,591); Mexico ($258); Argentina ($160); Japan ($1,601); Other countries ($7,405).

Yorkshire as a Manufacturing Centre

AN interesting brochure has been issued by the Yorkshire Electric Power Co. describing the remarkable combination of resources and facilities possessed by the area of their operations in the West Riding of Yorkshire and North Lincolnshire for the carrying on of manufacturing operations. At this time the company are increasing their normal activities in connection with the encouragement of industrial development as they anticipate the establishment of new factories and the extension of existing factories in this country for the production of goods which during recent years have been imported. Their new publication is being given a wide circulation throughout the world. It is printed in English, French and German and contains a map of Great Britain indicating the situation of the area and the advantages resulting therefrom, together with its many resources, transport facilities, seaports and connection with the trade routes of the world. It is pointed out that the lighter industries, which have developed in recent years, have shown a tendency to establish themselves in the London region, for reasons which were no doubt considered excellent. Such a tendency would undoubtedly have been less marked had the manufacturing and distributing advantages of this highly industrial area been more fully known.

Fatality at Runcorn Chemical Works

Explosion of Carbon Bisulphide Still

ONE man was killed and two others were injured in an explosion at the works of the Imperial Chemical Industries at Runcorn, Cheshire, on Wednesday, January 6. The victim was William Fred Sheen, of Wellington Street, Runcorn, and the two injured men are Peter Wakefield, (36), of Surrey Street, Runcorn, and Edmund Wainwright (35), of Barnes Cottages, Runcorn. The explosion, which occurred in the carbon bisulphide department, wrecked the building. Sheen's body was recovered from the debris after about three hours' search. The injured men were conveyed to the Runcorn Hospital suffering from burns about the hands and face.

Experts giving evidence at the inquest said they were unable to state the cause for the explosion. A wooden model of the plant was exhibited in the court, and the process was described by a representative of the firm. Mr. F. W. Hunt, H.M. Inspector of Factories was present, and Mr. W. S. Knowles represented the I.C.I.

John William Booth, the foreman, said the sulphur kiln fire in the carbon bisulphide plant had gone out, and at 2.40 p.m. he instructed Wakefield and Wainwright to light the fire. The fire was lighted by removing the lid of the kiln. He noticed that the fire which was lighted in the morning had gone out. They took the usual precautionary measures of shutting off the gas before opening the lid. Nothing was put in the kiln when the lid was lifted and the explosion occurred. Witness was on top of the chamber reaching down on to the lid when the explosion occurred. He saw a flash from the lid before the explosion. The explosion occurred in the inside of the apparatus, and was not due to any outside cause.

Replying to the Coroner, Booth said he had had fourteen years' experience of this work and had never previously had any indication of anything of the kind happening. He was entirely baffled as to the cause of the explosion.

Arthur Edward Waring, the manager of the works, said there had never been any previous explosion on the plant, which had been in operation for 32 years. The only theory he could advance was that sulphuretted hydrogen in the chambers had become incandescent when it came in contact with the air.

A verdict of " Misadventure " was returned.

Presentation of the Melchett Medal

THE Melchett Medal of the Institute of Fuel for 1931 (the second to be awarded) will be presented to Professor W. A. Bone, F.R.S., of the Imperial College of Science and Technology, South Kensington, by the President, Sir Hugo Hirst, Bt., at the Institution of Electrical Engineers, London, W.C.2, on February 1. The Melchett Medal was instituted by the Founder-President, the first Baron Melchett of Landford, who offered the Institute a sum of money sufficient to found the Medal in perpetuity, and is awarded annually to " such person, whether a member of the Institute or otherwise, as in the opinion of the Council has done either original research or professional, administrative or constructive work of an outstanding character, involving the scientific preparation or use of fuel, provided the results of such work have been made available within recent date for the benefit of the community." Following the presentation, Professor Bone will give the Melchett lecture, his subject being "A Century of Fuel Economy." Immediately following the meeting, Professor Bone will be the guest of the Institute at a dinner at the Connaught Rooms, tickets for which (price 12s., exclusive of wines) may be obtained on application to the Secretary, The Institute of Fuel, 53, Victoria Street, London, S.W.1. Members of all scientific and technical societies are invited to attend the presentation and lecture, for which no tickets of admission will be required.

Isolation of Pure Vitamin A

AFTER six years' research work, Dr. I. M. Heilbron, professor of organic chemistry at Liverpool University, in collaboration with Dr. R. A. Morton, of Liverpool University, and Professor J. C. Drummond, of University College, London, has obtained the first extract or distillation of pure vitamin A, although Professor Karrer, of Zurich University, working by a different method, has also been similarly successful. He hopes that it will eventually be possible to synthesize vitamin A, and thus make it available in larger quantities for the use of the medical profession.

Plastics and the Radio Industry

A Plea for More Colour

CAPTAIN J. W. BARBER presided at the fifth trade luncheon of the British Plastic Moulding Trade Association at the Connaught Rooms, London, when the principal speaker was Mr. R. Milward Ellis, chairman of the Radio Manufacturers' Association.

Mr. Ellis remarked that both the radio and plastic moulding trades had developed out of all proportions to that which had originally been thought possible. He criticised the plastic moulding trade, however, for its apparent lack of salesmanship, and suggested that instead of the radio industry having to go to the plastic moulders, there should be greater enterprise in submitting what they had to offer.

Mr. Bell (Belplastics, Ltd.) replied that generally a sample or blue print was thrown at the moulder with a request to produce the article at as low a price as possible. If the moulder suggested any improvement, the usual reply was that the radio firm's engineers had evolved the article, and not even the slightest alteration was allowed. He suggested that the radio industry should invite the engineers of the plastics trade to co-operate in the evolving of new apparatus before decisions were made.

Several other speakers referred to the efforts that were being made to educate various trades to adopt plastics, and the radio trade was urged to get away from the drab colours used up to now and to take with both hands the beauty and artistic effects that could now be produced in plastic materials. It was stated that one firm had moulded radio cabinets in colours which had proved to be the " best sellers " this season.

Sir Ernest Benn and Public Money

Hopefulness in the New Year

IN the absence of Mr. W. W. Pain, Sir Ernest Benn was the speaker at the forty-ninth Individualist Luncheon at the Hotel Victoria on January 13. He declared that reparations and inter-governmental debts were now "as dead as the dodo."

Since Dr. Brüning and Signor Mussolini had joined in the demand for the " wiping out of a large part of what he called this political money," we were at the beginning of a new era. When one realised that for the last 13 years every pound, every dollar, every franc, or every mark that people required for the conduct of their normal international trade had been in competition in the money markets of the world with this fictitious political nightmare of reparations and inter-Governmental debts, one began to see the folly of the whole business. Nevertheless, 1932 began to be hopeful, for that great political ramp was over. We now know that, whatever might appear upon the documents, not another cent or centime of reparations or inter-Governmental debts would ever be paid or extracted.

The position called for the immediate closing up of war time ministries, invented to win the war and left to lose the peace. The Ministry of Labour, for instance, which had been set up for the purpose of finding us work, remained as a huge vested interest in the absence of the thing which it was established to produce. They badly needed a new policy, a policy guided by the dictum that government was a necessary evil, and they should set their faces against any new proposals for government absurdities.

Iron and Steel Statistics

THE National Federation of Iron and Steel Manufacturers has issued its " Statistics of the Iron and Steel Industries " (1931), copies of which can be obtained from the offices of the Federation, Caxton House, Tothill Street, Westminster, S.W.1, price 5s. 6d. The new edition follows in the main those issued during the last ten years, but some new additions have been made in order to make still more complete the statistics relating to the various countries. The section relating to tariffs on imports of iron and steel products to certain countries has been added to by the addition of Argentina, China and Spain, while the sections dealing with Brazil and Chili have been extended. The production, etc., statistics for the United Kingdom are based on returns supplied by all iron and steel manufacturers throughout the country.

From Week to Week

SCOTTISH DYES, LTD., report having enough work on hand to keep 900 employees on full time for a year.

MR. JOSEPH PURDIE, B.Sc., of Killiecrankie, has received an appointment in the chemical department of the Burmah Oil Co., and has left for Rangoon.

THE SANDBACH COUNCIL has decided to send to the London headquarters of Imperial Chemical Industries, Ltd., a deputation regarding the closing of the Sandbach chemical works, which involves 250 men.

A FIRE OCCURRED at the premises of the Aston Chemical and Insulating Co., Ltd., Small Heath, Birmingham, early on Tuesday, January 12. The extent of the outbreak was confined to a comparatively small area. Little or no interruption of employment will result.

AN ERROR IN SPELLING occurred in the Buyers' Guide Section of *The Chemical Age Year Book*, 1932, in which one of the products of Ronsheim and Moore, of 11a Wormwood St., E.C.2, was classified under the spelling "Tetraline." Ronsheim and Moore's product is "Tetralin," which is a trade name for tetrahydronaphthalene.

MR. J. H. G. MONYPENNY, of Sheffield, addressed members of the Staffordshire Iron and Steel Institute, at Dudley, on January 12, his subject being "Some Recent Developments in Stainless Steel." Mr. Monypenny said that the last few years had seen remarkable strides, both in the metallurgy of stainless steels and in the range of their commercial application.

THE SOCIETY OF GLASS TECHNOLOGY will hold its meeting on January 20 in Manchester and *not* in Newcastle-on-Tyne as previously arranged. Meetings commencing at 10 a.m. and at 2.15 p.m. will be held in the College of Technology, and members and their friends will meet informally for luncheon at the Grand Hotel at 12.45 p.m.

A NEW COMPANY is being formed at Isle-Verte (Quebec), for the manufacture of by-products from potatoes. Immense acreage of potatoes exists in the counties on the Lower St. Lawrence, and very high yields are the rule. The new company will buy up the lower grade of potatoes for their process, leaving the farmer with his high-grade potatoes for sale.

A PRESENTATION OF A SILVER SALVER was made at the offices of Imperial Chemical Industries, Ltd., Liverpool, to Mr. D. Downey, formerly shipping manager of the United Alkali Co., who later was associated with Imperial Chemical Industries, until his retirement on December 31. Mr. R. H. Davidson, a director of the United Alkali Co., made the presentation.

AN AGREEMENT HAS BEEN SIGNED in Paris, between the Minister of Commerce and Industry and the Roumanian Minister in Paris, dealing with oil concessions in Roumania. Under this agreement, which will be valid for three years, French importers guarantee the importation from Roumania of an annual minimum quantity of 400,000 tons of refined oil and by-products. The agreement is officially described as the first step in the organisation of the European oil market.

IT IS OFFICIALLY STATED, according to a message from New York, that the completion of the merger of the Sinclair Consolidated Oil Corporation with the Prairie Oil and Gas Co. and the Prairie Pipe Line Co. will take place when a meeting of the boards of directors of the various companies is held. The new concern will be known as the Consolidated Oil Corporation. Negotiations have been proceeding for some time between the Sinclair Corporation and the Prairie Concerns, the Tidewater Associated Oil Co., the Rio Grande Oil Co., and the Standard Oil Co. of Nebraska.

THE NEED FOR CO-OPERATION in industrial research work was indicated by Mr. B. D. Parritt in an address to the Institution of the Rubber Industry on the value of organised research in the rubber industry at the Engineers' Club, Manchester, on Monday, January 4. By the co-ordination of scientific work between different industries, as between the rubber and electrical industries in the testing of ebonite, reduplication of effort and cost could be avoided. The rubber industry had not yet faced up to the problem of standardisation, which demanded close and systematic co-operation.

B. LAPORTE, LTD., are stated to have in hand a scheme for the extension of their works at Luton.

A PRELIMINARY PLAN of a proposed reconstruction of the chemistry laboratory at the United College, St. Andrews, has been passed by St. Andrews Town Council.

BELGIAN GLASS MANUFACTURERS have decided to revoke their decision to close down their works. The factories will continue in operation but production is to be reduced by one-half.

SOUTH AFRICAN STUDENTS from the University of Witwatersrand, Johannesburg, on Monday, paid a visit, under the guidance of Professor W. G. Sutton, to the works of Synthetic Ammonia and Nitrates, Ltd., Billingham, and to Dorman Long and Co.

A SLIGHT ERROR OCCURRED in describing the humidity meter made by Elliott Brothers, Ltd. (THE CHEMICAL AGE, January 9, page 28). This meter gives a direct reading of percentage relative humidity, *without* the necessity of referring to tables or curves.

THE COAL SECTION of the Economic Committee of the League of Nations met in Geneva on January 12 to consider the possibility of a European producers' cartel. Market organisation in the various countries and the attempts to arrive at international understandings were reviewed.

THE JANUARY NUMBER of the Summary of Current Literature relating to Water Pollution Research (H.M. Stationery Office, 2s. net) contains sections dealing with water supplies, analysis and examination, sewage, trade waste waters, and the pollution of natural waters.

SEVERAL OF THE OFFICERS elected at the recent annual meeting of the American Institute of Chemical Engineers are well known in European engineering circles. The new officers are: President, Dr. J. Van Nostrand Dorr; vice-president, Mr. A. E. Marshall; secretary, Mr. F. J. LeMaistre; treasurer, Mr. M. H. Ittner; auditor, Mr. D. Wesson; directors, Messrs. W. D. Dow, R. T. Haslam, H. C. Parmelee and J. C. Vail.

A CONFERENCE between representatives of the National Food Canning Council and the Council of the National Farmers' Union was held in Bedford Square, London, on Tuesday, January 12, to discuss a basis of co-operation between the growers of fruit and vegetables, and the canners. The canning industry has made such progress in the past two years that its chief problem is now to obtain a constant supply of home grown fruit and vegetables in sufficient quantities, more especially as many new canneries are now in operation in this country.

FRIENDS OF PROFESSOR CHANDLER presented to the trustees of Columbia University in 1910 a sum of money which constitutes the Charles Frederick Chandler Foundation. The income from this fund is used to provide a lecture by an eminent chemist and a medal for the lecturer in further recognition of his achievements in science. The lecturer this year will be Professor J. B. Conant, chairman of the Division of Chemistry, Harvard University. The lecture, on "Equilibria and Rates of Some Organic Reactions," will be given at Havemeyer Hall, Columbia University, on February 5.

REPRESENTATIVES OF THE BRITISH OIL DEVELOPMENT CO. met in Cannes on January 11 to discuss petroleum concessions on the right bank of the Tigris. Sir Edward Mountain, chairman of the Company, presided. German interests, including those of Krupps, were represented by Mr. Thomas Brown. The four Italian delegates are connected with the Azienda Generale Italiana Petroli. France was represented by M. Paul Girod. The petroleum concessions on the left bank of the Tigris were conceded to the Iraq Petroleum Co., in which British, American, Dutch and French interests are represented. The aim of the meeting at Cannes was to draw up a final agreement on the terms of the concession on the right bank.

Obituary

MR. GEORGE M'BETH MENZIES, chairman and managing director of the North British Steel Foundry Co., Ltd., Bathgate. Aged 47.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

356,283. AMMONIUM SULPHATE. H. J. Hodsman, 2 Norwood Grove, Victoria Road, Headingley, Leeds, and A. Taylor, 176 Victoria Avenue, Hull. Application date, May 30, 1930.

Ammonium sulphite which may be obtained by the action of sulphur dioxide on crude ammonia liquor is partly oxidised with an oxidising gas such as air or hot combustion gases in a packed tower in which partial evaporation also takes place. Oxidation is accelerated by the presence of manganous salts, cuprous chloride, cobalt salts, or ferrous sulphate. With cobalt salts, the pH value of the solution should be at least 8 and with iron salts the pH value should be below 6, and the temperature is preferably below 40° C. The oxidation is then completed electrolytically with electrodes of carbon, which may be rotated to agitate the electrolyte. The oxidation is preferably effected with a current density of 2 amps. per square decimetre.

356,344. DICALCIUM PHOSPHATE AND PHOSPHORIC ACID; DEMINERALISING BONES. Gelatines, Hasselt, and Vilvorde, Soc. Anon. and M. C. G. A. Berger, 9 Rue de la Régence, Brussels. Application date, June 20, 1930.

Bones are treated in wooden vats with phosphoric acid and one-third of the liquor is treated with lime to precipitate dicalcium phosphate. The filtrate is then added to 53°-60° Bé sulphuric acid until there is a slight excess of monocalcium phosphate. The mixture is stirred to agglomerate the calcium phosphate which is filtered out, and the liquor used again for treating a further quantity of bones. If an acid other than phosphoric is used for demineralising, the whole of the liquor is subsequently treated with lime.

356,380. BERYLLIUM CHLORIDE AND OXIDE. W. Kangro, 9 Humboldstrasse, Brunswick, Germany, and A. Lindner, 22 Spielmannstrasse, Brunswick, Germany. International Convention date, July 30, 1929.

Ores containing beryllium or oxides, silicates, or alumino silicates of beryllium or oxidised alloys containing beryllium are treated at 1,000° C. with chlorine or hydrochloric acid in the absence of a reducing agent to form and volatilise beryllium chloride or oxychloride. Any other chlorinated metals are separated by fractional volatilisation, and iron may be removed by preliminary chlorination at 800°-900° C. The issuing gases may be treated with air or oxygen to obtain beryllium oxide, or the chloride or oxychloride may be dissolved in water and beryllium hydroxide precipitated out.

356,523. PURIFYING MATERIALS FROM IRON. J. Y. Johnson, London. From I. G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, October 6, 1930.

Solid materials containing iron are treated to convert iron into a salt, which is then extracted with ether, aldehyde, ketone, or organic halogen compound preferably in the absence of water. Examples are given in which heavy spar is extracted with ether, methanol, acetone or chloroform saturated with hydrochloric acid gas; bauxite is extracted with ether, methylene chloride, trichlorethylene or ethylene chloride in the presence of hydrochloric acid gas; producer slag is treated with hydrochloric acid or sulphuric acid, dried, and extracted with ether, acetone, paraldehyde, or chloroform; and a mixture of nickel, or cobalt chloride, and ferric chloride is extracted with ether and hydrochloric acid.

356,603. 1 : 3-BUTYLENE-GLYCOL. Lonza Elektrizitätswerke und Chemische Fabrieken Akt.-Ges., 72 Aeschenvorstadt, Basle, Switzerland. International Convention date, December 13, 1929.

Acetaldol is reduced under a pressure of 40 atmospheres of hydrogen and a temperature of 50°-100° C. in the presence of butyl alcohol and a catalyst of nickel, copper, iron, or cobalt. The catalyst is obtained by reducing a metal compound in steps with gradually increasing quantities of hydrogen at the lowest possible temperature.

356,624. MICROCOSMIC SALT; POTAZOTE; FERTILISERS. Soc. d'Etudes Scientifiques et d,Entreprises Industrielles, Ougree, Belgium. Assignees of E. Voituron, 264 Rue Ernest Solvay, Sclessin, Ougree, Belgium. International Convention date, February 6, 1930. Addition to 342,931.

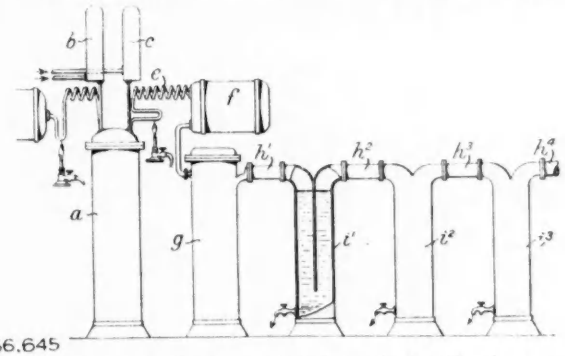
In the process for producing microcosmic salt described in Specification No. 342,931 (see THE CHEMICAL AGE, Vol. xxiv, p. 470) phosphoric acid and ammonia, which may be partly replaced by mono-, di- or tri-ammonium phosphate, are added to the mother liquor after the separation of potazote (potassium and ammonium chlorides) until it contains one molecule of phosphoric acid to two molecules of ammonia. The solution is cooled to separate microcosmic salt. The resulting mother liquor is acidified with phosphoric or hydrochloric acid so that the potazote subsequently obtained is free from phosphoric acid.

356,627. LEACHING ROCK PHOSPHATE. Kunstdünger Patent Verwertungs Akt.-Ges., Glarus, Switzerland. International Convention date, February 13, 1930.

Phosphate rock is leached with sulphuric acid, or nitric acid and alkali sulphate, and part of the unseparated reaction products is caused to react with more phosphate, after which the acid and alkali sulphate are added. An example of carrying out the process in a series of reaction vessels is described, the solution obtained being neutralised with ammonia to obtain a mixed fertiliser.

356,645. AMMONIA SYNTHESIS. A. Mentzel, 2 Nordsternstrasse, Schöneberg, Berlin. Application date, February 16, 1931.

Hydrogen for ammonia synthesis is generated from an electrolyte fed from vessels *b*, *c* into the gas chamber of a pressure vessel *a*, in which it is electrolysed. The outlet pipes *e* are of small capacity, and are heated to recombine the small quantity of each gas which contaminates the other gas.



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Hydrogen passes to the vessel *f* and is mixed with nitrogen at atmospheric pressure in the vessel *g*. The mixture then passes through reaction chambers h^1, h^2, h^3, h^4 with intermediate washers i^1, i^2, i^3, in which the ammonia is removed.

356,716. COLOURING VARNISHES. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, June 8, 1929.

Colouring materials for varnishes made from cellulose esters or artificial resins consist of complex metal compounds of azo dyes derived from *o*-oxydiazo compounds and naphthylamines, amino-naphthols, or their N-acyl derivatives, the dyes being free from sulphonic, carboxylic, sulphonamide or other groups inducing solubility in water. Examples are given of the preparation of a large number of chromium compounds of dyestuffs of the above class and their colouration of cellulose varnishes.

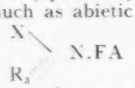
356,741. ALIPHATIC ACIDS. British Celanese, Ltd., 22 Hanover Square, London, H. F. Oxley and L. Fallows, of British Celanese, Spondon, near Derby. Application date, May 30, 1930.

Aqueous solutions of acetic, propionic, butyric and other lower aliphatic acids, or their vapours, are treated with the vapour of an entraining liquid such as benzene, xylene, trichlorethylene, dichlorethylene, ethylene dichloride, ethyl, propyl or butyl acetate. The treatment may be effected in

counter-current in a fractionating column, and the concentrated acid is then distilled to remove the entraining substance. The entraining substance may be of lower boiling point than the acid, in which case its vapour is introduced above the bottom of the column which is heated to the boiling point of the entraining substance. The concentrated acid is then obtained free from the entraining substance. The acid and entraining substance are preferably both introduced into the fractionating column in vapour form.

350,717. REDUCING FIRE RISKS WITH LIGHT HYDROCARBON OILS. W. Kritchevsky and E. Morril, 1401 West Jackson Boulevard, Chicago. International Convention date, June 20, 1929.

The electrical conductivity of light petroleum hydrocarbons is increased and ignition by sparking thereby prevented, by adding a substituted ammonium derivative of a fatty acid, such as oleic, stearic, palmitic, linoleic, lauric, or ricinoleic, or a resin acid, such as abietic acid, of the general formula



where FA represents a fatty or resin acid, R represents hydrogen, an alkyl group, or a hydroxy or a substitution derivative of an alkyl group, the same or different groups being used, and X represents an alkyl group, a hydroxy or substitution derivative of an alkyl group, a phenol group, or a benzyl group. Examples are given.

356,724. HYDROCYANIC ACID. Ges. für Kohlentechnik, 26 Deutschestrasse, Eving, Dortmund, Germany. International Convention date, June 7, 1929. Addition to 356,190.

Specification No. 356,190 (see THE CHEMICAL AGE, January 9, page 33) describes the production of hydrocyanic acid from ammonium sulphocyanide and nitric acid. In this invention, the nitrogen oxides obtained are converted into nitric acid in a synthetic ammonia and nitric acid plant, and the acid ammonium sulphate solution is neutralised with ammonia from the same plant.

356,609. DIACETONE ALCOHOL. Usines de Melle, Melle, Deux-Sevres, France. International Convention date, January 4, 1930.

An alcoholic solution of caustic potash is added to acetone with agitation and cooling, and the mixture then neutralised by adding an alcoholic or acetone solution of sulphuric or phosphoric acid. The precipitate is filtered off, and the diacetone alcohol separated by distillation.

356,728. ANTHRAQUINONE DERIVATIVES. R. J. Loveluck, R. F. Thomson, J. Thomas, Earl's Road, Grangemouth, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, June 6, 1930.

Mixtures of halogenated anthraquinones are obtained by ring closure of halogenated 2-benzoylbenzoic acids in sulphuric acid, etc., and are separated by fractional dilution of the solution. In an example, phthalic anhydride is mononitrated, the nitro group replaced by chlorine, condensation with benzene effected and the mixture heated with oleum to effect ring closure. Water is added to precipitate 2-chloranthraquinone which is filtered off, and water again added to precipitate 1-chloranthraquinone. Another examples describes the separation of 2 : 3- and 1 : 2-dichloranthraquinones.

356,742. RESIN ACID DERIVATIVES. Chemische Fabriken Dr. K. Albert Ges., Amöneburg, Biebrich, Wiesbaden, Germany. International Convention date, August 19, 1929.

Resin acids are boiled with acetic anhydride, and the resulting anhydrides purified by recrystallisation and treated with alcohols, phenols, amides, amines, hydroxyamines, etc., to form derivatives. Diluents such as ether, alcohol, or benzene may be added. Examples are given of the production of various esters of abietic acid, and the application to pyroabietic acid, tetrahydroabietic acid, tetrahydroxyabietic acid and halogenised abietic acids are also referred to.

356,752. DYES. British Celanese, Ltd., 22 Hanover Square, London, G. H. Ellis and H. C. Olpin, of British Celanese, Spondon, near Derby. Application date, June 6, 1930.

Cellulose esters or ethers are dyed with azo dyes containing an anthracene nucleus not substituted at the meso-carbon atoms, *e.g.*, those obtained by coupling with an anthrol or anthramine diazo compounds of the benzene, naphthalene or anthracene series such as those of aniline, α- or β-naphthylamine or their homologues, or halogen, hydroxy, alkoxy, alkylamines or carboxy derivatives, *e.g.*, *p*-nitraniline, 2 : 4-dinitraniline, *p*-nitro-*o*-toluidine, *p*-nitro-*o*-anisidine or *p*-nitro-*o*-phenetidine, also aminoazobenzene, aminoazotoluene or benzeneazo-naphthylamine. A number of examples are given.

350,787. ACETIC AND OTHER ALIPHATIC ACIDS. H. Dreyfus, 22 Hanover Square, London. Application date, May 13, 1930.

Acetic, propionic, butyric and other lower aliphatic acids are homogeneously mixed with another liquid which forms with water an azeotropic mixture boiling at a lower temperature than the acid, and distilled. The dilute acid and added liquid may be introduced into the heated concentrated acid, or into a heated mixture of concentrated acid and added liquid in a still having a rectifying column. The added liquid separating from the condensate is returned to the still, and concentrated acid is drawn off and distilled to obtain anhydrous acid. Alternatively, dilute acid, concentrated acid and the added liquid may be introduced into a distilling column from which concentrated acid is drawn off at the bottom. The added liquid may be benzene, xylene, trichlorethylene, ethylene dichloride, ethyl, propyl or butyl acetate.

350,933. DITHIOAMINES. Goodyear Tire and Rubber Co., 1144 East Market Street, Akron, Ohio, U.S.A. International Convention date, October 5, 1929.

Rubber is preserved against oxidation by the addition of a dithioamine of the general formula

where R and R_1 are similar or dissimilar aromatic nuclei. In an example, phenyl-β-naphthylamine is treated with sulphur chloride in benzene solution to obtain dithiophenyl-β-naphthylamine. Dithio-di-α- or β-naphthylamines, dithio-diphenylamine, dithiotolyl-naphthylamine, dithiophenyl-naphthylamine, dithioxylyl-naphthylamines, dithio-hydroxyphenyl-naphthylamines and dithio-mononitrophenyl-naphthylamine are obtained in a similar manner.

Specifications Accepted with Date of Application

363,622. Metallic oxy-compounds, Treatment of. L. Mellerson-Jackson. (*Intermetal Corporation*). August 18, 1930.

363,626. Destructive hydrogenation of solid fuels, Apparatus for. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). August 21, 1930.

363,644. Vulcanization of rubber. Rubber Service Laboratories Co. October 2, 1929.

363,647. Dyestuffs and intermediates of the anthraquinone series. W. W. Triggs. (*E. I. Du Pont de Nemours and Co.*). June 13, 1930.

363,668-9. Dyes and dyeing. D. A. W. Fairweather, J. Thomas and Scottish Dyes, Ltd. June 13, 1930.

363,711. Oxidation of hydrocarbons. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). September 19, 1930.

363,735. Carbon and hydrogen, Manufacture of. N. Grunstein. October 3, 1929.

363,740. Fast vat dyestuffs, Manufacture of. A. Carpmael. (*I. G. Farbenindustrie Akt.-Ges.*). October 6, 1930.

363,770. Sulphonation products, Manufacture of. Society of Chemical Industry in Basle. October 29, 1929.

363,776. Catalysts, Manufacture of. Howards and Sons, Ltd., J. W. Blagden and G. C. H. Clark. November 6, 1930.

363,788. Fornates of alkaline earth metals, Production of. R. Koepp and Co., E. Elöd, and M. Enderli. November 14, 1930.

363,810. Polymerization of diolefines. J. Y. Johnson. (*I. G. Farbenindustrie Akt.-Ges.*). December 11, 1930.

363,812. Gas producers for generating continuously a gas mixture for ammonia synthesis. K. Keller and M. Lengyel. December 11, 1930.

363,832. Vat dyestuffs, Manufacture of. A. Carpmael. (*I. G. Farbenindustrie Akt.-Ges.*). December 22, 1930.

363,837. Alloys of beryllium with heavy base metals, Production of. H. Baron. (*Siemens Halske Akt.-Ges.*). December 23, 1930.

363,848. Removal of ammonia and sulphuretted hydrogen from gases. H. Leithauser. January 6, 1930.

363,861. Alkaline earth metal alloys having as a basis iron or copper. Siemens and Halske Akt.-Ges. January 21, 1930.

363,862. Rubber, Treatment of. Naugatuck Chemical Co. March 18, 1930.

363,871. Decalification of mixed calcium and magnesium carbonate materials. C. Arnold. (*Dolomite, Inc.*). January 28, 1931.

363,895. 1 :4-Dioxane, Manufacture of. Carbide and Carbon Chemicals Corporation. February 20, 1930.

363,909. Alumina and alkali phosphates, Production of. Chemische werke vorm. H. and E. Albedt. March 22, 1930.
363,936. Barium sulphate of definite granule size, Manufacture of. Sachtleben Akt.-Ges. für Bergbau und Chemische Industrie. April 28, 1930.
363,948. Alkali metal acetates, Manufacture of. C. Arnold. (*Dow Chemical Co.*). May 18, 1931.
363,950. Diazo preparations, Manufacture of. Society of Chemical Industry in Basle. May 21, 1930.
363,955. Azo-dyestuffs, Manufacture of. A. Carpmael. (*I. G. Farbenindustrie Akt.-Ges.*). May 26, 1931. Addition to 349,000.
363,971. Eliminating sodium carbonate from technical solutions of potassium carbonate, Process of. (*I. G. Farbenindustrie Akt-Ges.*). August 20, 1930.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Allen, T. G., Mason, F. E., and Silver Springs Bleaching & Dyeing Co., Ltd. Dyeing cellulose acetate silk in black shades. 266. January 5.
Aluminium, Ltd. Method for making fluoride materials. 316. January 5. (United States, January 29, '31.)
Aluminium Plant & Vessel Co., Ltd., and Seligman, R. Apparatus for treating liquids for pasteurisation thereof. 427. January 6.
Blagden, J. W., Howards & Sons, Ltd., and Huggett, W. E. Isolating or purifying terpene alcohols, etc. 211. January 4.
Boot's Pure Drug Co., Ltd., Easson, A. P. T., and Pyman, F. L. Production of organic salts of bismuth. 394. January 6.
British Celanese, Ltd., and Groombridge, W. H. Performing catalytic reactions. 381. January 6.
Carpmael, A. (*I. G. Farbenindustrie Akt.-Ges.*). Manufacture of metal-organic complex compounds. 535. January 7.
Chemical Reactions, Ltd. (*Deutsche Gold und Silber-Scheideanstalt vorm. Roessler.*) Destructive hydrogenation of carbonaceous materials. 76, 77. January 1.
Coley, H.E. Manufacture of metallic nitrides, etc., from nitrogen. 127. January 2.
—— Manufacture of cyanides from nitrogen. 128. January 2.
—— Manufacture of alloys. 129. January 2.
—— Extraction of gold from arsenical ores. 130. January 2.
—— Reduction of carbonates, etc. 131. January 2.
Cooper, C. Controlling chemical reactions. 552. January 8.
Dreyfus, H. Manufacture of condensation products. 298. January 5. Cellulose derivatives. 380. January 6.
—— Manufacture of oxygenated organic compounds. 482. January 7.
Grindley & Co., Ltd., and Yeates, R. L. Production of synthetic resins. 716. January 9.
Groves, W. W. (*I. G. Farbenindustrie Akt.-Ges.*). Manufacture of solutions of fibroin. 411. January 6. (September 10, '30.)
Hall, H. E. Process for solvent manufacture from fermentation. 580. January 8.
I. G. Farbenindustrie Akt.-Ges. Process for manufacture of azo dyestuffs. 224. January 4. (Germany, January 3, '31.)
—— Manufacture of carbazole-2-ketones. 515. January 7. (Germany, January 12, '31.)
—— Vat dyestuffs. 611. January 8. (Germany, January 12, '31.)
—— Manufacture of azo dyestuffs. 713. January 9. (Germany, January 10, '31.)
—— Manufacture of azo dyestuffs. 714. January 9. (Germany, January 9, '31.)
Imperial Chemical Industries, Ltd., and Lefebure, V. Calcium sulphate plaster mixes, and methods of applying same. 238. January 4.
—— Purification of gases. 532. January 7.
—— and Naunton, W. J. S. Phenol-formaldehyde condensation products, etc. 635. January 8.
Johnson, J. Y. (*I. G. Farbenindustrie Akt.-Ges.*). Thermal treatment of materials containing polymerizable hydrocarbons. 190. January 4.
—— Manufacture of softening, etc., agents. 191. January 4.
—— Apparatus for manufacture of hydrogen, etc. 192. January 4.
—— Manufacture of condensation products containing nitrogen. 491. January 7.
—— Manufacture of catalysts containing molybdenum and tungsten. 648. January 9.
Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Manufacture of ketones. 537. January 7. (United States, January 17, '31.)
Riley, G. W., and Scott, G. & Son, London, Ltd. Concentration of liquids. 436. January 6.

Points from Manufacturers' Literature

The Editor welcomes copies of new brochures and leaflets describing plant, equipment and products of interest to chemical manufacturers and the chemical-using trades.

THE CALORISING PROCESS and a few of its applications are described in a recent illustrated brochure issued by The Calorizing Corporation of Great Britain, Ltd., 32 Farringdon Street, London, E.C.4. Calorising protects the treated metals by providing a self-forming, self-renewing coating of a practically infusible material (alumina), which is impervious to oxygen, carbon, sulphur, and the products of combustion of all common fuels up to maximum metal temperature of 1,750° F. (950° C.). The process is accomplished by fusing aluminium into the surface of the base metal, with which it forms a homogeneous alloy for a definite depth. Protective action is due to the aluminium oxide formed on the surface by the action of heat. Below this oxide is the ferro-aluminium alloy rich in aluminium which diffuses further into the base metal. Should the coating of alumina be removed by abrasion, it will be automatically reformed when the damaged surface of the ferro-aluminium alloy is exposed to heat. In addition to the advantages obtained by calorising commercial steel and iron for use at high temperatures, the value of the process when applied to heat resisting alloys for service at temperatures of 1,830° F. (1,000° C.) and upwards is now generally recognised. This is particularly the case when many alloys of the nickel chromium class are subjected in service to the action of sulphurous gases.

* * *

OXY-ACETYLENE EQUIPMENT FOR WELDING and cutting metals is the subject of a series of new sectional catalogues issued by The British Oxygen Co., Ltd. (incorporating Allen Liversidge, Ltd.), of Angel Road, Edmonton, London, N.18. The equipment illustrated and described is the result of many years' research and experimental work, and a wide knowledge of the requirements of the welder. The company are manufacturers of both high pressure and low pressure welding and cutting plant. Both systems involve the use of oxygen stored under pressure in cylinders, but whereas in the case of high pressure plant the acetylene is also supplied under pressure in cylinders (dissolved acetylene), in the case of low pressure plant the acetylene supply is drawn from an acetylene generator. Where one or two welders only are employed, where the welding work is intermittent, or where portability is an essential feature of the equipment, the company recommend the use of high pressure welding plant. Where several welders are employed and the work is continuous, the use of low pressure welding plant is suitable.

* * *

ABSORPTION SPECTROPHOTOMETRY is dealt with in a new publication of Adam Hilger, Ltd., 24 Rochester Place, Camden Road, London, N.W.1. This booklet is more than a catalogue of instruments; it is a guide to the choice of apparatus for laboratories in which measurements of the absorption curves of substances would assist in the elucidation of problems with which they are concerned, but whose adoption of such methods has been retarded by a lack of guidance as to the most suitable apparatus that can be used. Prominence is given to the first published catalogue description of the Hilger-Spekker ultra-violet photometer, a new type of instrument for this work. Among the illustrations is a full page reproduction of a part of an actual absorption photograph taken with this apparatus. In its introductory paragraphs the importance of quantitative absorption spectrophotometry, as opposed to the early method of Hartley, is stressed and some idea is conveyed of the possibilities of these measurements in resolving complex problems of organic chemistry, as well as their applications in the control of manufacturing processes.

New Sodium Sulphate Plant in Canada

THE construction of a new sodium sulphate plant is contemplated by a Canadian firm. The site of the sodium sulphate deposits parallels the Canadian National Railway's tracks for a distance of 12 miles between Oban and Lndis. When completed this plant will be the fifth in the Province of Saskatchewan..

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID, ACETIC, 40% TECH.—£18 15s. per ton d/d address U.K. in casks.

ACID CHROMIC.—11d. per lb., less 2½% d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° TW.—Spot, £20 to £25 per ton makers' works, according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8d. per lb., d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35/37%.—Spot, £7 19s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 per ton. (Packed in 1 cwt. bags, carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards.)

CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d station in drums.

CHROMIUM OXIDE.—10d. to 10½d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3¾d. per lb. Liquor, £19 10s. per ton d/d U.K.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 8d. to 2s. 3d. per gall.; pyridinised industrial, 1s. 10d. to 2s. 5d. per gall.; mineralised, 2s. 9d. to 3s. 3d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—5d. per lb. net d/d U.K., discount according to quantity; ground 5¾d. per lb.

POTASSIUM CHLORATE.—3¾d. per lb. ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

SALAMMONIAC.—First lmp, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.

SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77° E.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS, CAKE AND POWDER.—4d. per lb. net d/d U.K., discount according to quantity. Anhydrous 5d. per lb.

SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3⅝d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£15 per ton, f.o.r. London, casks free.

SODIUM SILICATE., 140° TW.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d.

SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton, d/d in drums. Crystals—Spot, £8 5s. per ton, d/d in casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton; d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—5½d. to 6¼d. per lb. Crude 60's 1s. 4d. to 1s. 5d. per gall.

ACID CRESYLIC 99/100.—1s. 8d. to 1s. 9d. per gall. B.P., 2s. 6d. to 3s. per gall. Refined, 2s. to 2s. 2d. per gall. Pale, 98%, 1s. 7d. to 1s. 8d. Dark, 1s. 4d. to 1s. 4½d.

BENZOLE.—Prices at works: Crude, 7d. to 7½d. per gall.; Standard Motor, 1s. 2d. to 1s. 3d. per gall. 90%.—1s. 3d. to 1s. 4d. per gall. Pure, 1s. 6d. to 1s. 7d. per gall.

TOLUOLE.—90%, 2s. 4d. per gall. Pure, 2s. 6d. per gall.

XYLOL.—2s. per gall. Pure, 2s. 3d. per gall.

CREOSOTE.—Standard specification, for export, 4¾d. to 5d. net per gall. f.o.b.; for Home, 3¾d. per gall. d/d.

NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 5d. to 1s. 6d. per gall. Solvent, 90/190, 11d. to 1s. 2d. per gall.

NAPHTHALENE.—Purified Crystals, £11 10s. per ton, in bags.

PITCH.—Medium soft, 70s. per ton, in bulk at makers' works.

PYRIDINE.—90/140, 3s. 9d. to 4s. per gall. 90/160, 4s. to 4s. 6d. per gall. 90/180, 2s. to 2s. 6d. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID GAMMA.—Spot, 3s. 3d. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.

m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

p-CRESOL 34.5° C.—1s. 9d. per lb., in ton lots.

DICHLORANILINE.—2s. 5d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.

DINITROBENZENE.—7¾d. per lb.

DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7¾d.-8d. per lb.

DIPHENYLAMINE.—Spot, 1s. 8d. per lb., d/d buyer's works.

a-NAPHTHOL.—Spot, 1s. 9d. per lb. d/d buyer's works.

B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.

a-NAPHTHYLAMINE.—Spot, 10½d. per lb. d/d buyer's works.

B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb.; 5-cwt. lots, drums extra, d/d buyers' works.

NITRONAPHTHALENE.—8¾d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.

m-XYLIDINE ACETATE.—3s. 3d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. per ton. Grey, £12 per ton. Liquor, 8d. to 9d. per gall.

ACETIC ACID, TECHNICAL, 40%.—£16 15s. to £17 15s. per ton.

ACETONE.—£63 to £65 per ton.

AMYL ACETATE, TECHNICAL.—90s. to 98s. per cwt.

CHARCOAL.—£6 10s. to £10 10s. per ton, according to grade and locality.

IRON LIQUOR.—24°/30° Tw., 10d. to 1s. 2d. per gall.

METHYL ACETONE, 40/50%.—£52 per ton.

RED LIQUOR.—16° Tw., 8½d. to 10d. per gall.

WOOD CREOSOTE.—1s. to 2s. 6d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gall. Solvent, 3s. 9d. to 4s. 9d. per gall.

WOOD TAR.—£2 10s. to £6 per ton.

BROWN SUGAR OF LEAD.—£32 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1½d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 5d. to 1s. 7d. per lb.

BABYTES.—£7 to £8 10s. per ton, according to quality.

CADMIUM SULPHIDE.—3s. 6d. to 3s. 9d. per lb.

CARBON BISULPHIDE.—£30 to £32 per ton, according to quantity; drums extra.

CARBON, BLACK.—4d. to 5d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£45 to £55 per ton, according to quantity drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.

DIPHENYLGUANIDINE.—2s. 6d. per lb.

INDIARUBBER SUBSTITUTES, WHITE.—4d. to 5½d. per lb.; Dark, 4d. to 4½d. per lb.

LAMP BLACK.—£46 to £50 per ton.

LITHOPONE, 30%.—£20 to £22 per ton.

SULPHUR.—£12 5s. to £15 15s. per ton.

MINERAL RUBBER "RUPRON."—£18 10s.

PIPERIDINE RUBBER ACCELERATORS.—P.P.D., 10s. 6d. to 11s. 6d. per lb.; Z.P.D., 7s. to 7s. 6d. per lb.; L.P.D., 6s. 6d. to 7s. per lb.; P.T.D., 9s. 8d. to 10s. 4d. per lb.; C.P.D., 8s. 3d. to 8s. 10d. per lb.; S.P.D., 8s. 1d. to 8s. 7d. per lb.; Suparac, Standard, 7s. per lb.; Suparac, Z, 3s. 6d. per lb.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.

SULPHUR PRECIP. COMMERCIAL.—£50 to £55 per ton.

VERMILLION, PALE OR DEEP.—6s. 8d. to 6s. 10d. per lb.

ZINC SULPHIDE.—1s. to 1s. 2d. per lb.

Pharmaceutical and Photographic Chemicals

The following additional changes are reported :—

BARBITONE.—11s. 3d. to 12s. 3d. per lb.

HEXAMINE.—2s. 8d. to 3s. per lb.

SODIUM BARBITONUM.—11s. 6d. to 12s. 6d per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Chas. Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.

Glasgow, January 13, 1932.

DULLNESS continues in the Scottish heavy chemical market, most of the business being the completion of contracts for the current year.

ACETONE.—B.G.S.—Quoted £65 to £68 per ton ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £48 to £59 per ton; pure, 80%, £38 5s. per ton; technical, 80%, £37 5s. delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s. per ton; B.P. powder, £36 10s. per ton, in 1-cwt. bags, delivered Great Britain free in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at £51 to £53 per ton, ex store.

ACID, SULPHURIC.—£3 12s. 6d. per ton, ex works, for 144° quality. £7 per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 1s. to 1s. 0½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted round about £8 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted at £9 5s. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—British dog tooth crystals quoted round £32 to £35 per ton, carriage paid according to quantity.

ANTIMONY OXIDE.—Spot material obtainable at round about £33 per ton, ex wharf.

ARSENIC, WHITE POWDERED.—Quoted £25 10s. per ton, ex wharf. Spot material still on offer at £26 per ton, ex store.

BARIUM CHLORIDE.—Price about £10 10s. to £11 10s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—British manufacturers' contract price to consumers £8 15s. per ton, in 5s. 6d. cwt. casks.

CALCIUM CHLORIDE.—British manufacturers' price, £5 5s. to £5 15s. per ton, according to quantity and point of delivery.

COPPERAS, GREEN—At about £3 15s. per ton, f.o.r. or ex works.

FORMALDEHYDE, 40%.—Now quoted £29 per ton, ex store.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station.

LEAD, RED.—Price now £30 per ton, delivered buyer's works.

LEAD, WHITE.—Quoted £40 per ton, carriage paid.

LEAD ACETATE.—White crystals quoted round about £42 to £43 per ton c.i.f. U.K. ports. Brown on offer at about £1 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £9 10s. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p., quoted 1s. 8d. to 2s. 3d. per gallon.

POTASSIUM BICHROMATE.—Quoted 5d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—96% to 98%. In fair demand. Spot material on offer, £28 per ton ex store.

POTASSIUM CHLORATE.—99¾/100% Powder.—Quoted £34 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £24 10s. per ton, c.i.f. U.K. ports. Spot material on offer at about £25 per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 8½d. per lb. ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 8d. per lb., ex store.

SODA, CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77%, £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums; all carriage paid buyer's station, minimum four-toun lots; for contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 4d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, four-ton lots.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyer's works on contract, minimum four-ton lots. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £14 per ton; roll, £12 10s. per ton; rock, £11 5s. per ton; ground American, £10 10s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £18 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Calendars and Diaries Received

THE following additional seasonal reminders have been received :—

The Cambrian Wagon Co., Ltd., East Moors Road, Cardiff.—A tear-off daily calendar.

Carty and Son, Ltd., Harders Road, Peckham, S.E.15.—Refill cards for the calendar supplied last year.

Feed Water Specialists Co., St. Paul's Square, Liverpool.—A small pocket diary.

The Premier Filterpress Co., Ltd., Moorgate, E.C.2.—Refill cards for the calendar supplied last year.

The United Steel Companies, Ltd., Sheffield.—A weekly desk memorandum pad.

Scottish Dyes, Ltd., Grangemouth.—A pocket diary and season ticket case, with memorandum relating to dyestuffs.

The Chemical Supply Co., Ltd., Idol Lane, Eastcheap, E.C.3.—A combined desk diary and memorandum pad.

Bulmer Rayon Company

PRESIDING at the meeting of the Bulmer Rayon Co., Ltd., on December 31, Sir William Bulmer said that since the last meeting the British Acetate Silk Corporation had been put into compulsory liquidation. Some of the shareholders in the Bulmer Rayon Co., like the directors, were individual shareholders in that corporation. In course of the discussion which followed, he said that certain negotiations were now proceeding which would, if successful, be very much to the benefit of the Bulmer Rayon Co. Several shareholders suggested liquidation, but the chairman strongly advised them to await the results of the negotiations. The report and accounts were adopted. A special resolution providing for the appointment of a committee of inspection was not proceeded with.

Extracting Iodine from Seaweed

A NEW method for obtaining iodine and potash from seaweed without the usual process of burning the weed and forming kelp was outlined at a recent lecture given in Galway by Professor Thomas Dillon, of University College, Galway. The seaweed is collected and placed into tanks where it is allowed to rot; the liquid formed contains both iodine and potash as soluble salts, and on evaporating and clarifying the deposit the iodine and potash are easily separated. The residue left in the tank is principally cellulose, which may be used in the manufacture of paper or rayon.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, January 14, 1932.

A RATHER larger volume of business has been booked during the past week with inquiry showing a considerable increase. In practically every section prices continue firm with a tendency towards higher levels. Export inquiries are more numerous.

General Chemicals

ACETONE.—Firm conditions continue to operate in this market which is ruling strong at £65 to £68 per ton, with a satisfactory demand.

ACID, ACETIC.—Continues in good request with prices firm at the unchanged rates of £37 5s. to £39 5s. per ton for Technical 80% and £38 5s. to £40 5s. per ton for Pure 80%.

ACID, CITRIC.—In rather better request with the market firm at about 1s. 2½d. per lb., less 5%.

ACID, FORMIC.—In active demand and is quoted firm at £50 10s. to £52 per ton.

ACID, OXALIC.—Has been in good request with the price firm and unchanged at £50 per ton in casks, and £51 10s. per ton in kegs.

ACID, TARTARIC.—In strong demand, with the market ruling very firm at about 1s. 2d. to 1s. 2½d. per lb., less 5%.

ALUMINA SULPHATE.—Has been in active request with price rather higher at £8 15s. to £9 10s. per ton.

AMMONIUM CHLORIDE.—Is a normal market with offers at about £20.

ARSENIC.—There has been a fair amount of inquiry with imported material quoted at about £24 per ton c.i.f. main U.K. ports. Cornish material is only available for forward delivery at about £28 per ton.

BARIUM CHLORIDE.—In steady demand at about £11 per ton.

CREAM OF TARTAR.—The market is very firm and is quoted at about 103s. 6d. to 105s. per cwt., less 2½%.

FORMALDEHYDE.—In good request at about £30 per ton.

LEAD ACETATE.—The market is firmer at £43 to £44 per ton for the White Quality, with Brown £1 per ton less and in good demand.

LITHOPONE.—Firm at about £20 per ton, with the market for the imported material nominal.

POTASSIUM BICHROMATE.—In good request at 5d. per lb. with the usual contract discounts over the first three months of this year.

POTASSIUM CHLORATE.—In good demand at about £32 to £34 per ton.

POTASSIUM PERMANGANATE.—Needle Crystals B.P. in good request at 8¼d. per lb.

POTASSIUM PRUSSIATE.—Continues firm at about 8½d. per lb. and in good demand.

SODIUM ACETATE.—Firm at about £23 per ton and in good request.

SODIUM BICHROMATE.—In good demand at 4d. per lb. with contract discounts for delivery over the first three months of this year.

SODIUM CHLORATE.—Continues in good demand at about £30 per ton.

SODIUM HYPOSULPHITE.—Rather more business has been offered with the market firm at the recently advanced prices.

SODIUM NITRITE.—In fair request at £20 to £22 per ton.

SODIUM PRUSSIATE.—Firm at 5d. to 5½d. per lb.

SODIUM SULPHIDE.—In fair demand at British makers' prices.

ZINC SULPHATE.—In rather better demand and steady at £12 per ton.

Coal Tar Products

THE coal tar products market remains quiet. There is very little inquiry, with the exception of naphthalenes, for which there is quite a good demand, and prices are higher, with practically no stocks available.

MOTOR BENZOL.—Is unchanged, at about 1s. 4½d. to 1s. 5½d. per gallon, f.o.r.

SOLVENT NAPHTHA.—Is quoted at about 1s. 1½d. to 1s. 2d. per gallon, f.o.r.

HEAVY NAPHTHA.—Obtainable at about 11d. to 1s. 0½d. per gallon, f.o.r.

CREOSOTE OIL.—Is unchanged, at about 3d. to 3½d. per gallon f.o.r. in the North, and at about 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Remains at about 1s. 6d. per gallon f.o.r. for the 98/100% quality, and at about 1s. 4d. per gallon for the Dark quality 95/97%.

NAPHTHALENES.—Quoted at £3 to £3 10s. per ton for the firelighter quality, at £4 to £4 10s. per ton for the 74/76 quality, and at about £5 10s. to £6 per ton for the 76/78 quality.

PITCH.—Is quoted at about 67s. 6d. per ton, f.o.b. East Coast Port.

Latest Oil Prices

LONDON, January 13.—LINSEED OIL was steadier. Spot, ex mill, £15 10s.; January, £13 2s. 6d.; February-April, £13 15s.; May-August, £15; September-December, £16 2s. 6d. per ton, naked. RAPE OIL was inactive. Crude, extracted, £30; technical refined, £32 per ton, naked, ex wharf. COTTON OIL was slow. Egyptian, crude, £18; refined common edible, £22; and deodorised, £24 per ton, naked, ex mill. TURPENTINE was quiet. American, spot, 52s. 6d.; February-April, 53s. 3d. per cwt.

HULL.—LINSEED OIL.—Spot and January, £13 12s. 6d.; February-April at £13 17s. 6d.; May-August at £14 17s. 6d. per ton, naked. Baltic, spot, not quoted. COTTON OIL.—Bombay, crude, spot, not quoted; Egyptian, crude, spot, £17 10s.; edible, refined, £20; technical, spot £20; deodorised £22 per ton, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £23 per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £27 10s.; deodorised, £31 10s. per ton. SOYA OIL.—Crushed-extracted, spot, £20; deodorised, £23 10s. per ton. RAPE OIL.—Crushed-extracted, spot, £28 10s.; refined, £30 10s. per ton. COD OIL, 16s per cwt. CASTOR OIL.—Pharmacy, spot, 45s. 6d.; firsts, 40s. 6d.; seconds, 38s. 6d. per cwt. TURPENTINE.—American, spot, 55s. per cwt.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—*Export.*—The demand for sulphate of ammonia continues quiet and transactions are small. The price remains unchanged at £5 5s. per ton f.o.b., U.K. port in single bags. *Home.*—It is understood that a great many merchants and farmers have covered their requirements for the spring. Some merchants are taking delivery now to avoid congestion later on. The price of £7 per ton, delivered in 6 ton lots to consumers' nearest stations, remains unchanged.

IMPORTED NITRATE OF SODA.—The price given in our last issue remains unchanged and the demand for this product appears to be sluggish.

BRITISH NITRATE OF SODA.—The price remains unchanged.

NITRO-CHALK.—It appears that small sales are still being made and a large demand is expected in the spring. The price of £7 5s. per ton remains in force.

Scottish Coal Tar Products

CREOSOTE OIL.—Has been attracting considerable attention during the week and supplies for prompt delivery are scarce. Refined tar is also firm, but other products are unchanged.

CRESYLIC ACID.—Market remains weak with quotations easy. Pale, 99/100 per cent., 1s. 4d. to 1s. 5d. per gallon; pale, 97/99 per cent., 1s. 2d. to 1s. 3d. per gallon; dark, 97/99 per cent., 1s. 1d. to 1s. 2d. per gallon; all f.o.r. makers' works. High boiling acid is steady, however, at 2s. 6d. to 3s. per gallon.

CARBOLIC SIXTIES.—Only small quantities are available, for which makers are now quoting 1s. 7d. to 1s. 8d. per gallon ex works in bulk.

CREOSOTE OIL.—Inquiries are numerous and supplies for prompt delivery are difficult to secure. Quotations are firm as follows:—Specification oils, 2¾d. to 3¼d. per gallon; washed oil, 3½d. to 3¾d. per gallon; gasworks ordinary, 3¾d. to 4d. per gallon; all f.o.r. works in buyers' rail cars.

COAL TAR PITCH.—Prices in the home market have increased to about 70s. per ton ex makers' works. Export value is nominal at 65s. to 70s. per ton f.o.b. Glasgow.

BLAST FURNACE PITCH.—A steady demand continues at controlled prices of 40s. per ton f.o.r. works, and 45s. per ton f.a.s. Glasgow for export.

REFINED COAL TAR.—Makers are still disinclined to quote for forward delivery and value from prompt remains steady at 4d. per gallon ex works.

WATER WHITE PRODUCTS.—Continue without interest. Motor Benzole, 1s. 3½d. to 1s. 4½d. per gallon; 90/160 solvent, 1s. 2½d. to 1s. 3½d. per gallon; and 90/190 heavy solvent, 1s. 0½d. to 1s. 1½d. per gallon; all in bulk ex works.

South Wales By-Products

THERE is very little change in South Wales by-product activities. Business generally is slow and sporadic, the call for practically all products being unsatisfactory. The demand for pitch continues to be confined to small, prompt parcels, and it is significant that most patent fuel makers and other big users are buying in a manner which suggests anticipation of a fall in values. Road tar has a slightly better call, with values unchanged round about 13s. per 40-gallon barrel delivered. Naphthas continue to be slow, solvent having only a small call, and heavy with practically no demand. Refined tars are a slightly brighter feature with the demand steady, if moderate. There is no change in quotations for either coke-oven or gasworks tar. Creosote remains weak, but motor benzol remains fairly strong. Patent fuel and coke exports are slightly better. Patent fuel prices, for export, are:—19s. to 19s. 6d., ex ship Cardiff; 18s. to 18s. 6d., ex ship Swansea. Coke prices are:—Best foundry, 32s. 6d. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 17s. to 18s.

Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, January 13, 1932.

The chemical market here has been steady to firm in all sections during the past week. With the sterling exchange of late free from violent fluctuations, the price movements of imported materials have been within a comparatively narrow compass, although the market in these lines is likely to continue to be extremely sensitive to influences of this kind. On the whole, business has now pretty well got back to where it was before the year-end interruption. There is a moderate movement of spot parcels of the leading "heavies," with fair quantities being taken against contract commitments. The textile dyeing and finishing trades in many instances are able to maintain the improved scale of operations.

Heavy Chemicals

Chlorate of soda keeps very steady in the neighbourhood of £30 per ton, with a quiet business going through. A fair amount of interest is being displayed in the case of caustic soda, contract offers of which are unchanged on the basis of £12 15s. to £14 per ton, according to quality. Not a great deal of interest has been reported this week in sulphide of sodium, values of which are at £11 to £11 10s. per ton for the 60-62 per cent. concentrated solid material, and about £9 for the commercial grade. Saltcake meets with a moderate demand, with current prices at round £3 2s. 6d. per ton. There is a fair amount of inquiry about in the case of bicarbonate of soda, which remains very firm at £10 10s. per ton. Alkali is in a somewhat similar position at £6 per ton. A fair demand has been in evidence in prussiate of soda, which is a strong section at from 5d. to 5½d. per lb., according to quantity, for crystals. Phosphate of soda maintains its recent steadiness, although only a relatively quiet business has been put through during the past few days: the dibasic material is on offer at up to £13 10s. per ton. With regard to bichromate of soda, this meets with a fair amount of inquiry and prices are steady on the basis of 4d. per lb., less 1 to 3½ per cent., in contracts, and 4d. net in respect of prompt parcels. Hyposulphite of soda is moving in moderate quantities, with the photographic grade on offer at up to £15 10s. per ton, and the commercial at £9 to £9 5s.

The potash products generally have maintained recent levels. Chlorate is in quiet demand, with values at from about £34 to £35 per ton. Business in the case of permanganate of potash has been rather slow, but at from 6½d. to 6¾d. per lb. for the B.P. quality and 6¼d. for the commercial there is no alteration in prices to record. Bichromate of potash is in moderate request and quotations keep up at 5d. per lb., less 1 to 3½ per cent., in contracts, and 5d. per lb. net for spot parcels. Carbonate of potash is very steady at round £32 per ton, with caustic on offer in the region of £38. There is a quiet trade passing in yellow prussiate of potash, values of which keep steady at about 8½d. per lb.

The demand for sulphate of copper shows little indication of expanding, but prices in this section seem steady at the moment at from £18 to £18 10s. per ton, f.o.b. A quiet trade is passing in arsenic, with white powdered, Cornish makes, in continued short supply at round £26 per ton, at the mines, and imported kinds at £25. There is not much doing in the acetates of lime, but prices are steady at from £7 10s. to £8 per ton for the brown grade and about £12 for the grey. The acetates of lead are in quiet demand at £44 per ton for the white and £41 for the brown.

Acids and Tar Products

Citric and tartaric acids are both very firm at round 1s. 2½d. and from 1s. 2d. to 1s. 2¼d. per lb., respectively. The call for oxalic acid is on moderate lines, with values very firm at round £2 10s. per ton, ex store. There is a fair movement in the case of acetic acid, which is quoted at £52 per ton for the technical glacial quality and £39 5s. for the 80 per cent. commercial.

Pitch is firm and in rather short supply for prompt shipment at from £3 10s. to £3 15s. per ton, f.o.b. Creosote oil remains a comparatively quiet section at 3¼d. to 4¾d. per gallon, naked. Solvent naphtha is firm at up to 1s. 4d. per gallon. The export demand for carbolic crystals keeps up and values are maintained at round 6½d. per lb., f.o.b., crude 60's ranging from about 1s. 8d. to 1s. 9d. per gallon, naked.

Company News

"L. and N." Brown Coal Co.—The report for the year ended September 30 shows a loss carried to balance sheet of £13,136, which, with a debit balance of £40,277 brought in, makes a total debit of £53,413 to be carried forward.

British Glues and Chemicals, Ltd.—A circular to shareholders states that, owing to present trading conditions, the directors have decided not to make any payment on January 31 on account of the fixed dividend on the 8 per cent. cumulative participating preference shares. The dividend on these shares is paid to January 31, 1931.

Transparent Paper, Ltd.—At the annual meeting in London, on December 23, it was stated that the result of the year's trading was a loss of £27,006. The chairman pointed out that the principal difficulty of the company had been shortage of working capital during that period, and a scheme for the reconstruction of capital had therefore been arranged At subsequent meetings of shareholders, the necessary resolutions were carried providing for the reduction, increase and reorganisation of the capital.

"L. and N." Coal Distillation Co.—The profit and loss account for the year ended June 30, 1931, shows income tax refund £198, plus transfer and registration fee £6, making £204; after charging salaries, office and general administration expenses (other than development) £1,674, interest paid and accrued, less received £4,323, there is a loss carried to balance-sheet of £5,793, to which is added debit balance brought in £19,951, making a total debit balance of £25,744 to be carried forward.

Broken Hill Proprietary Block 14.—The report for the half-year ended September 30, 1931, states that the working loss was £3,026. Administration costs £1,236, contributions to workers' compensation fund £1,396, reduction in value of Commonwealth Government Bonds by £1,049 to bring them to market value at September 30, the writing off of balance of £2,366 against shares in Block 14 Exploration N.L., and £214 against prospecting plant at Crookwell, together with amounts paid in rents, rates and insurances £211, bring the total net loss to £9,120.

Distillers Co., Ltd.—Payment will be made on February 1 of an interim dividend of 1s. 6d. per share (7½ per cent.), less tax, on the ordinary shares of £1 each. This is at the same rate as last year's interim, which was followed by a final of 12½ per cent., making 20 per cent. for the year.

Michael Nairn and Greenwich, Ltd.—For the year to December 31, 1931, the accounts of this company, which holds a controlling interest in the Greenwich Inlaid Linoleum (Frederick Walton's New Patents), Co., and Michael Nairn and Co., show a net profit of £207,842, compared with £215,531 in 1930. This is all absorbed in the payment of the dividend, which for the ninth consecutive year is maintained at 12½ per cent.

Saccharification of Wood.

In a recent communication to the Society of Chemical Industry, Drs. H. A. Auden and W. P. Joshua described a process for the transformation of wood cellulose into fermentable products on an industrial scale. With an improved method they have succeeded in obtaining thirty-five to forty gallons of alcohol per ton of dry sawdust. This makes the process commercially profitable where the cost per ton of dry sawdust is not more than five shillings and a supply of 200 tons per twenty-four hours is available. The method was worked out in the Research Laboratory of the Distillers' Co. at Epsom. It consists in forcing acidulated water (containing two parts per thousand of sulphuric acid), at a temperature of 180° C. and twelve atmospheres pressure, through sawdust packed in lead-lined vessels. Under these conditions 45-50 per cent. of the sawdust is changed into fermentable sugars. The molasses thus obtained are fermented with yeast in order to obtain alcohol. A preliminary treatment of the sawdust with superheated steam has been found advantageous, because it removes resins and other undesirable constituents and also helps the hydrolysis.

New Rayon Selling Company

According to information from Amsterdam the Aku Company announces the establishment by the Aku-Glanzstoff concern and the Breda Artificial Silk Company of a combined selling organisation styled the International Rayon Trading Co.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette, &c.

Bankruptcy Information

ALLERTON, R., Chiswell House, Finsbury Pavement, London, E.C., merchant, carrying on business as the "Hilda Chemical Company." (R.O., 16/1/32.) Receiving Order January 5, 1932. Creditor's petition. First meeting January 21, 1932, 11 a.m., at Bankruptcy Buildings, Carey Street, London, W.C.2. Public examination March 23, 1932, 11 a.m., at Bankruptcy Buildings, Carey Street, London, W.C.2.

SWANN, WILLIAM, 25 Altar Drive, Heaton, Bradford, lately carrying on business as "The Laurel Chemical Company," at Laurel Works, Hubert Street, Leeds Road, Bradford. Chemical manufacturer. (R.O., 16/1/32.) Receiving Order January 5, 1932. Creditor's petition.

New Companies Registered

ALFORDS (LUBRICANTS), LIMITED. 8 Lloyds Avenue, London, E.C.3. Registered December 28. Nominal Capital £1,000 in £1 shares. Manufacturers, refiners, blenders, importers and exporters of oils, greases, fats, glycerine, chemicals and other similar and allied substances, shipowners, wharfingers, etc. Directors:—G. W. Bristow, E.M. Pearson, N. E. Chappell.

BRADFORD BY-PRODUCT AND FERTILISER CO., LTD., 25 Sunbridge Road, Bradford.—Registered December 24. Nominal capital £100 in £1 shares. To carry on the business of dealers in the blood of animals, extractors therefrom or manufacturers of and dealers in serum, gum, nitrates, ammonia, ammonium sulphate, phosphorus pentoxide, potash, artificial manure, fertilisers and other products and by-products, etc.

GELATINE AND PHOSPHATES, LTD., 701 Salisbury House, London, E.C.2. Registered January 9. Nominal capital £100 in £1 shares. Manufacturers of and dealers in gelatine, phosphates, isinglass and glues; chemists, druggists, oil and colour men, etc.

M. S. AND G., LTD., 52 Queen Victoria Street, London, E.C.4. Registered January 7. Nominal capital £34,000 in £1 shares. Distillers, refiners, extractors, producers, manufacturers and suppliers of all solid, liquid and gaseous substances or materials derived from mineral oil or petroleum, or shale oils, or any other hydrocarbon material or substance, manufacturers of and dealers in crude mineral oil or its fractions, petrol, naphthas, kerosene, gas and fuel oils, etc. Directors: W. B. Mitford, J. Swallow, E. W. Brocklebank.

NOZODA, LTD., Wardrobe Chambers, 146a Queen Victoria Street, London, E.C.4.—Registered December 18. Nominal capital £200 in 10s. shares. Chemical manufacturers, soap and soda manufacturers, etc. Directors: J. S. G. Telfer, G. H. D. Soames.

R. A. L. GRACIE AND CO., LTD., 62 Sword Street, Dennistown, Glasgow. Registered in Edinburgh December 31. Nominal capital £1,000 in £1 shares. Refiners, distillers, lime and chalk dealers, etc. Directors: W. Cochrane, R. Houston, and R. A. L. Gracie.

G. F. WARREN, LTD. Registered January 2. Nominal capital £1,000 in £1 shares. To use, etc., processes in connection with the deposition of metals. Directors: C. R. Warren, 20 Queen Anne's Place, Bush Hill Park, Enfield; and G. F. Warren.

"C.A." Queries

We receive so many inquiries from readers as to technical, industrial, and other points, that we have decided to make a selection for publication. In cases where the answers are of general interest, they will be published; in others, the answers will simply be passed on to the inquirers. Readers are invited to supply information on the subjects of the queries:—

173. (*Chemicals*).—An inquirer wishes to get in touch with the manufacturers of "Puritol" and "Catalosyl."

174. (*Lactoform*). A London subscriber is anxious to know the name and address of the company supplying Lactoform.

Chemical Trade Inquiries

CAPE TOWN.—The City of Cape Town is calling for tenders, to be presented in Cape Town by June 15, for a filtration plant capable of dealing with 300,000 gallons of water per day. (Ref. B.X. 11069.)

COPENHAGEN.—A firm of soap and perfume manufacturers desires to form connections with United Kingdom firms for the supply of aluminium and bakelite goods, colours, transparent paper, nigrosin, etc. (Ref. C.X. 3784.)

OSLO.—A commission agent at Oslo wishes to obtain representation of United Kingdom manufacturers of glue. (Ref. No. 69.)

EGYPT.—A firm of commission agents in Cairo wishes to undertake agencies of United Kingdom manufacturers of heavy chemicals, etc. (Ref. No. 79.)

EGYPT.—The Egyptian Ministry of War and Marine is calling for tenders, to be presented in Egypt by March 8, for 70,945 metric tons of cocoanut oil. (Ref. B.X. 7234.)

Tariff Changes

INDIA.—The following items are extracted from the Indian Customs Tariff as in operation on January 1, 1932:—

	DUTY.
Bleaching paste and bleaching powder	Free.
Camphor	50 per cent.
Copperas, green	2½ per cent.
Copperas, green, if imported in bulk, per cwt.	2½ per cent.
Opium and its alkaloids, per seer of 80 tolas	Rs. 30 or 18¾ per cent. *ad valorem*, whichever is higher.
Cinchona Bark and alkaloids extracted therefrom	Free.
Heavy Chemicals:	
Acid, hydrochloric per cwt.	Rs. 3-3-3.
Acid, nitric—	
Having a density at 15° C. of not more than 1.42 grammes per cubic centimetre; per cwt.	Rs. 4-8-6.
Having a density at 15° C. of more than 1.42 grammes per cubic centimetre per cwt.	Rs. 6-7-9.
Acid, sulphuric per cwt.	Re. 1-9-0.
Alum, namely, ammonia alum, potash alum or soda alum per cwt.	Re. 1-2-9.
Aluminium sulphate or hydrated aluminium sulphate including, alumino-ferric and alum cake—	
Containing not more than 0.01 per cent. of iron per cwt.	Re. 1-0-3.
Containing more than 0.01 per cent. of iron per cwt.	Re. 0-11-3.
Copper sulphate or hydrated copper sulphate per cwt.	Rs. 3-12-0.
Magnesium chloride per cwt.	Re. 0 8-9.
Magnesium sulphate or hydrated magnesium sulphate—	
Containing not more than 50 per cent. of magnesium sulphate per cwt.	Re. 1-9-0.
Containing more than 50 per cent. of magnesium sulphate per cwt.	Rs. 3-2-0.
Sodium sulphate or hydrated sodium sulphate—	
Containing not more than 50 per cent. of sodium sulphate per cwt.	Re. 0-7-6.
Containing more than 50 per cent. of sodium sulphate per cwt.	Re. 1-0-3.
Sodium sulphide or hydrated sodium sulphide per cwt.	Re. 1-12-9.
Zinc chloride or zinc chloride solution per cwt.	Rs. 5-6-3.
Sulphur	Free.
Chemicals, Drugs and Medicines, not otherwise specified *Ad valorem*	25 per cent.

CZECHOSLOVAKIA.—A Supplementary Agreement to the German-Czechoslovak Commercial Treaty of June 29, 1920, provides that coal-tar dyestuffs, containing not more than 80 per cent. of common salt (sodium chloride), Glauber salt (sodium sulphate), soda (sodium carbonate) or dextrin, or mixtures of these substances, when imported into Czechoslovakia from Germany, will be treated for tariff purposes as coal-tar dyestuffs under Tariff No. 625. A subsequent Exchange of Notes lays down that such dyestuffs will not in general be subjected to Customs analysis provided that a declaration by the producing firm as to the percentage content of the above-mentioned substances is submitted at the time of importation of the goods. A copy of the prescribed form of declaration may be seen by persons interested at the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. This Agreement further declares that applications for licences to import slaked lime (Tariff No. 150a) into Czechoslovakia from Germany will be accorded favourable treatment by the Czechoslovak Government. The Agreement is provisionally enforced as from December 15, and will remain valid until August 31, 1932.